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A Pilot Study on the Affective Responses to Watching Consecutive Episodes of a Television Show during Aerobic Exercise below the Ventilatory Threshold

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Abstract and Keywords

A quasi-experimental pilot study determined whether restricting television-watching to treadmill walking below the ventilatory threshold improved affective valence, perceived activation, enjoyment, attentional focus, and intention to bundle television-watching with exercise. Eleven inactive, young adults (21.18 $\pm$ 1.47 years) in post-secondary education performed two 40-minute exercise tests, wherein aforementioned outcomes were repeatedly assessed. Participants in the experimental group (n=4) watched the first episode of a television show between exercise tests and the second episode of the same television show during the second exercise test. Analyses revealed large, non-significant multivariate intervention effects on affect and attention outcomes, a large, significant univariate intervention effect on affective valence during cool-down [$T(1,8)=8.838$, $p=0.021$, $\eta_p^2=0.723$], and medium-to-large, non-significant univariate intervention effects on other affect and attention outcomes. A large, significant intervention effect on intention to bundle [$T(8)=-2.336$, $p=0.048$, $\eta_p^2=0.406$] was also found. Taken together, this temptation bundle enhanced individuals' exercise experience and influenced their exercise plans.

Keywords: aerobic exercise, television, contingent reward, dissociation, affect, intention

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I never thought that I would write a thesis, and that's likely because I did not anticipate having the support that I've had these past two years. I'd, first and foremost, like to thank my supervisor for taking me on as a Master's student when I had little background in exercise psychology, and encouraging me to pursue a topic that was unrelated to his research. The liberty to design and conduct a study of my own has taught me many lessons that I will carry forward with me in my future work. To my lab mates and peers, I would like to say thank you for being role-models, sounding boards, guinea pigs, on-call technicians and, most importantly, great friends. Your passion to uncover and divulge the truth has pushed me to do more in and outside of my academics, and your companionship made it all feel a lot less like… dare I say work? Last but not least, I would like to thank my family and friends for their unwavering love and continuous votes of confidence. You always believed that I had it in me to write this thesis and were able to convince me of it, even when I myself could not.

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Chapter 1

1 Introduction

A large proportion of adults fail to meet physical activity guidelines associated with optimal health and quality of life, imposing severe consequences on the economy (Jansen, 2012; Statistics Canada, 2014). Former physical activity interventions have failed to support individuals' continued engagement in physical activity but current physical activities interventions, addressing physical activity correlates and appealing to individuals' hedonistic predispositions, show promise of doing so (Dishman, 1988; Linke, Gallo, & Norman, 2011; Papandonatos et al., 2012; Schneider, Dunn, & Cooper, 2009; Williams et al., 2008).

This chapter will outline physical activity guidelines, physical activity outcomes, physical inactivity prevalence rates and current physical activity interventions in order to convey the importance of developing effective physical activity interventions; and discuss the framework underlying former and current physical activity interventions, and the proposed mechanism(s) through which they exert their influence to substantiate the testing of a "hybrid" intervention that targets specific physical activity correlates.

1.1 Optimal Physical Activity

Decades of research have been devoted to ascertaining the dose of physical activity needed to attain optimal health and quality of life. Their findings have cumulated to the development of physical activity guidelines, which recommend that specific types of physical activity be performed for specific durations and at specific frequencies. Those who meet these guidelines are considered sufficiently active, whereas those who do not are considered insufficiently active or inactive (Sedentary Behaviour Research Network, 2012).

Unique physical activity recommendations exist for different cohorts to meet their needs, abilities and constraints. The Canadian Physical Activity Guidelines advise healthy adults, aged 18-65 years, to accumulate 150 minutes of moderate-to-vigorous,

aerobic physical activity per week, in bouts of 10 minutes or more, and engage in resistance activities at least two days per week (Canadian Society of Exercise Physiology [CSEP], 2016). Recommended methods for attaining these levels and types of physical activity include, but are not limited to, joining a walking or running group, taking a dance class after work, taking up a favourite sport, or raking the lawn (CSEP, 2016). If they are planned, repetitive, and structured, and performed to improve one or more components of individuals' physical fitness, these physical activities are considered exercise (Caspersen, Powell, & Christenson, 1985).

1.2 Physical Activity Classifications

Physically inactive adults must be able to classify physical activity by intensity and metabolic processes in order to meet physical activity guidelines. Physical activity is classified as light, moderate or vigorous based on the rate that energy is consumed during work as opposed to rest, and aerobic or anaerobic based on the metabolic processes that are used to supply muscles with oxygen.

1.2.1 Light, Moderate, & Vigorous-Intensity

The body expends 1.1-2.9, 3.0-5.9 and 6.0> metabolic equivalents during light, moderate, and vigorous physical activity (Pate et al., 1995). The exact rate of energy consumption for a physical activity can be determined through direct or indirect calorimetry, wherein heat production or oxygen inhalation and carbon dioxide exhalation are measured (Haugen, Chan, & Li, 2007). However, the time, equipment and expertise needed to perform these procedures make them impractical to perform outside of a laboratory setting (Haugen, Chan, & Li, 2007). Although studies have concluded that specific physical activities are light, moderate, and vigorous in intensity using these procedures, the gradual progression between some physical activities (e.g., leisurely walking, brisk walking) can make them difficult to distinguish between.

Heart rate is positively correlates with energy consumption rates and requires fewer resources than calorimetry so can also be used to classify physical activity by intensity (Haugen, Chan, & Li, 2007). Moderate and vigorous physical

activity elicits 64-76% and 77-89% of maximum heart rate, and 40-59% and 77-89% of heart rate reserve for the average adult (American College of Sports Medicine [ACSM], 2013). Maximum heart rate is the highest heart rate that individuals can achieve without incurring adverse health outcomes (ACSM, 2013). It is determined through a max stress test or predicted by subtracting an individual's age from 220 (ACSM, 2013). Heart rate reserve is the difference between an individual's predicted or measured heart rate and resting heart rate, which can be measured using a heart rate monitor or by taking one's pulse at rest (ACSM, 2013). The latter accounts for interpersonal variability in resting heart rate and better corresponds with oxygen consumption reserve so is preferred to the former (Swain, 2006).

Physically inactive and deconditioned adults should target the lower bounds of moderate physical activity parameters when they begin an exercise program, and progressively increase exercise intensity over several weeks as they continue that program to avoid adverse outcomes (ACSM, 2013).

1.2.2 Aerobic & Anaerobic Metabolic Processes

Aerobic metabolic processes predominantly use oxygen, whereas anaerobic metabolic processes do not. Initially, during both types of physical activity, high-energy phosphates donate a phosphate to ADP and glycogen becomes converted to glucose in order to produce ATP (Brown, Miller, & Eason, 2006). Resulting pyruvate is converted to acetyl-CoA if sufficient oxygenated blood is transported to the muscle, or lactate insufficient oxygenated blood is transported to the muscle (Brown, Miller, & Eason, 2006). Acetyl-CoA is subsequently processed through the Krebs cycle to produce more ATP, while lactate is transported to the liver in order to be converted back to glycogen (Brown, Miller, & Eason, 2006). Aerobic and anaerobic metabolism continue until glycogen stores become depleted, but anaerobic metabolism is further limited by muscle fatigability, ion regulation, and reactive oxygen species (Bogdanis, 2012).

Accumulation of lactate in the blood can be used as a marker for the transition between metabolic processes because lactate, produced in the muscle, is released into the bloodstream during anaerobic metabolism. Although blood samples are practical and economical to obtain, they are invasive, require expertise to perform and require equipment to analyze so are imprudent if participant recruitment is a concern, study personnel are inexperienced and/or necessary equipment is inaccessible (Daper & Hodgson, 2008). Oxygen inhalation and carbon dioxide exhalation are associated with the accumulation of lactate in the blood but, for previously mentioned reasons, are impractical to measure outside of a laboratory setting (Haugen, Chan, & Li, 2007). Fortunately, former studies have concluded that long, low-to-moderate physical activities predominantly use metabolic processes, and short and long vigorous physical activities predominantly use anaerobic metabolic processes (Cooper & Storer, 2001).

Physically inactive and deconditioned adults can benefit from both aerobic and anaerobic physical activity but, due to intensity recommendations and the practicability of physiological adaptations, are encouraged to engage in more aerobic physical activity when they began an exercise program (ACSM, 2013).

1.3 Physical Activity & Inactivity Outcomes

Optimal or adequate levels of physical activity are positively associated with substantial health outcomes that increase life expectancy and improve quality of life, and are inversely associated with health outcomes that reduce life expectancy and quality of life. These outcomes not only affect the individual engaging in optimal or suboptimal levels of physical activity, but those in their micro, macro and ecosystems as well.

1.3.1 Benefits of Physical Activity

Adequate physical activity increases life expectancy by preventing, slowing the progression of, and treating chronic disease, and preventing premature death (Warburton, Nicol, & Bredin, 2006). More specifically, it reduces the risk of chronic disease by 20-80% and premature death by 20-35%,

making it more effective than some chronic disease medications (Warburton, Nicol, & Bredin, 2006). Adequate physical activity also enhances quality of life by managing chronic disease symptoms, optimizing functional capacity, and maintaining independence (Warburton, Nicol, & Bredin, 2006). Consistent with the rudimentary dose-response relationship between physical activity and health, suboptimal levels of physical activity generate fewer benefits of lesser value, like improved mood and cognitive performance (Chang, Labban, Gapin, & Etnier, 2012). The value of these benefits is further discounted by the economic impact of physical inactivity outcomes.

1.3.2 Consequences of Physical Inactivity

Physical inactivity reduces functional capacity and predisposes individuals to morbidity, which reduces work output and quality, increases the number and duration of leaves, and leads to higher use of health care services (Burton, Chen, Conti, Schultz, Pransky, & Edington, 2005; Edington & Burton, 2003). The economic cost of physical inactivity can be approximated by determining the prevalence of physical inactivity, proportion of chronic diseases caused by physical inactivity, the risk of chronic disease in physically inactive individuals, and direct and indirect health care costs associated with chronic disease. Jansen (2012) used this method to attribute $6.8 billion of direct and indirect health care costs in 2009 to physical inactivity. This estimation is probably lower than the actual economic cost though, because it only accounted for seven physical inactivity-related chronic diseases and precluded household production as an indirect health care cost (Jansen, 2012).

1.4 Prevalence of Physical Inactivity

Despite the well-known benefits of adequate physical activity and consequences of inadequate physical activity, the majority of adults are physically inactive nationally and worldwide. Prevalence rates of physical inactivity can be determined through subjective assessment and/or direct measurement of physical activity over time,

comparison of results with physical activity guidelines, and extrapolation to the greater population.

1.4.1 National Prevalence

The Canadian Health Measures Survey (CHMS) is a cross-sectional study that collects information from 3-79 year olds living in Canada's 10 provinces (Tremblay, Wolson, & Gorber, 2007). It uses self-report assessment tools that prompt users to recall time spent engaging in physical activities, and direct measurement tools that detect and record time spent engaging in physical activities in order to determine the prevalence of physical inactivity (Tremblay, Wolson, & Gorber, 2007). Results from the 2007 and 2009 CHMS revealed that 15% of adults engaged in 150 minutes of moderate-to-vigorous, aerobic, physical activity per week, in bouts of 10 minutes or more (Shields, Tremblay, Laviolette, Graig, Jansen, & Gorber, 2010). Although results from the 2012 and 2013 CHMS suggest that only 5% more of Canadian adults are meeting physical activity guidelines now, they confirm that the vast majority (80%) remains physically inactive so could benefit from physical activity intervention (Statistics Canada, 2014).

1.4.2 International Prevalence

Different physical activity guidelines and assessment or measurement tools make it difficult to compare national prevalence rates of physical inactivity, but the global assessment and measurement of physical activity allows for some comparison. Estimates of physical inactivity in adults from 122 countries suggest that 1 in 3 people worldwide were physically inactive in 2010 (Hallal et al., 2012). Comparing the estimates for different regions further suggests that American, European and Mediterranean regions had a greater prevalence of physical inactivity than African and Asian regions at this time (Hallal et al., 2012). This disparity is thought to result from income differences because regions with higher income have more technology, and technology reduces the opportunity for occupational labour, active transportation and leisure-time activity

(Hallal et al., 2012). While the prevalence of physical inactivity is expected to increase in all regions, it is expected to most dramatically increase in those undergoing industrialization (Hallal et al., 2012).

1.5 Physical Activity Interventions

A greater appreciation for physical activity and inactivity outcomes, and increasing prevalence rates of physical inactivity have instigated policy change that guides the development and conduct of physical activity interventions.

1.5.1 International Intervention

Member States of the World Health Organization (WHO, 2015) devised physical activity recommendations for national policy makers in 2010. These recommendations specify the amount and types of physical activity that different cohorts should engage in, the strategies that should be used to increase engagement in physical activity, how physical activity should be monitored to assess the efficacy of physical activity strategies, and how the aforementioned should be integrated and communicated with the public (WHO, 2015). Examples of recommended physical activity strategies include the development of national physical activity guidelines, introduction of policies that promote active transportation, and provision of environments that support active transportation and recreation (WHO, 2015). No report has affirmed that the WHO's physical activity recommendations have been fulfilled, but the development of physical activity guidelines and on-going implementation of physical activity strategies suggest that they are.

1.5.2 National Intervention

ParticipACTION, a national, non-profit sport, exercise and physical activity organization, was founded in 1971 to inform the public about the importance of physical activity (ParticipACTION, 2015). It has since expanded its aims to include the provision of safe spaces and creation of social networks that enable Canadians' participation in sport, exercise, and physical activity

(ParticipACTION, 2015). ParticipACTION accomplishes this by connecting people with programs that provide physical activity opportunities, and coordinating sector involvement in the creation and provision of these programs (ParticipACTION, 2015). Greater support is given to programs that aim to improve physical literacy because "motivation, confidence, physical competence, knowledge about and [appreciation for] physical activity" are considered antecedents to a physically active lifestyle (ParticipACTION, 2015; Whitehead, 2006).

1.6 Frameworks Underlying Interventions

The majority of physical activity programs developed over the last century have focused on changing people's knowledge, attitudes, and beliefs about physical activity, but research linking other psychological, social, and environmental factors with physical activity has encouraged researchers to reconsider this approach.

1.6.1 Cognitive-based Models

Cognitivism asserts that humans are rational beings that choose to engage in behavior by collecting relevant information and considering possible outcomes, and act upon their decisions (Raab, Wylleman, Seiler, Elbe, & Hatzigeorgiadis, 2016). Cognitive-based programs have succeeded in educating the public on the importance of accumulating adequate physical activity but have had limited success in modifying intention to become active and supporting initiation of physical activity. This is exemplified by a national survey of Australian adults, wherein 92% of respondents demonstrated an awareness and understanding of physical activity outcomes but only 57% reported engaging in adequate physical activity and ~30% expressed an interest in becoming physically active within the next six months (Armstrong, Bauman, & Davies, 2000). Cognitive-based programs have also failed to support the maintenance of physical activity, as evidenced by high dropout rates from and poor adherence to exercise programs (Dishman, 1988; Linke, Gallo, & Norman, 2011).

1.6.2 Social-ecological Models

Socio-ecological models posit that interactive effects of personal and environmental factors, like industrialization, can account for some of this intention-behaviour gap (Sallis, Owen, & Fisher, 2008; Stokols, 1992). Industrialization gives rise to technology that reduces the physical demand of everyday tasks by assisting with their execution or replacing them with sedentary alternatives (Hallal et al., 2012). Capital gained from implementing technology in occupation and transportation domains promotes the normalization of sedentary behaviour and forces people to pursue physical activity "on their own time" (Hallal et al., 2012). A competitive market concurrently encourages the development of technologies that create more opportunities for sedentary behaviour in leisure and household domains (Hallal et al., 2012). These opportunities compete with other activities that involve moving and, when chosen, further reduce physical activity. This is exhibited by positive associations between inactive leisure time and screen time (Shields & Tremblay, 2008).

Television watching accounts for a substantial amount of time in the leisure domain. According to the Canadian Radio-television and Telecommunications ([CRTC], 2015), the average Canadian adult watched 3.4 hours of television per day and 27.2 hours of television per week in 2015 despite a perceived lack of time to engage in adequate physical activity (Canadian Association for Health, Physical Education, Recreation and Dance, 2004). The majority of Canadian adults continue to watch television via cable or satellite but an increasing number of Canadian households have "cut the cord" (CRTC, 2015). Increased computer time and constant television time suggests that some adults are streaming episodes of television shows uploaded to the Internet instead of watching them via cable or satellite (CRTC, 2015). Streaming services, like Netflix, further promote physical inactivity by enabling users to watch television practically anywhere and anytime for a fraction of the cost of basic cable television (Strangelove, 2016).

1.6.3 Motivational Hedonism

Research linking pleasure and enjoyment with greater physical activity suggests that decisions to engage in or avoid physical activity may be more rudimentary than other models suggest. Physically inactive and deconditioned adults that experienced more pleasure during acute, moderate exercise reported engaging in more physical activity 12 months later than those that did not (Williams et al., 2008). Likewise, low-active adults that experienced more pleasure during acute, moderate exercise reported walking more cross-sectionally and longitudinally than those that did not (Papandonatos et al., 2012). This is consistent with the notion that behaviour is motivated by the pursuit of pleasure and avoidance of displeasure, otherwise referred to as the hedonic principle.

1.7 Hedonic Theories

The hedonic principle has been utilized in different models to explain how affect, in terms of core affect, emotion and mood, influences decisions to engage in or avoid physical activity. Core affect is an immediate and unprocessed feeling that contributes to the evaluation of emotions and moods, like enjoyment and cheerfulness (Rusell, 2003). Emotion is shorter lived than mood but is higher in intensity and more strongly associated with identifiable events, like exercise (Frijda, 1993; Weiss & Cropanzano, 1996).

1.7.1 Affective Responses to Exercise

Preliminary research compared individuals' mood before and after exercise, and found that exercise consistently elicits more desirable moods (Ekkekakis & Petruzzello, 2000). This finding led to the presumption that exercise is inherently pleasurable, but discrepancy between mood after exercise and exercise adherence generated question of whether this mood improvement represented a reaction to exercise conclusion, rather than exercise execution (Ekkekakis & Petruzzello, 2000). Coincident distinction of affective terms and subsequent appraisal of affect assessment tools instigated the development of scalar tools that assessed core affect during exercise (Ekkekakis & Petruzzello, 2000). Research comparing individuals' core affect before, during and after

exercise confirmed that exercise elicits a “feel better” effect after exercise, but revealed that exercise elicits variable core affect during exercise (Ekkekakis & Petruzzello, 2000). Positive correlations between core affect during exercise and future exercise behaviour further suggest that core affect influences individuals’ plans to pursue or avoid exercise (Papandonatos et al., 2012; Schneider, Dunn, & Cooper, 2009; Williams et al., 2008).

1.7.2 Recalled Affective Responses

Some believe that core affect collectively experienced during exercise determines whether exercise will be recalled as pleasurable or displeasurable and, thereby, whether it will be repeated. Kahneman and Fredrickson (1993) provided preliminary support for this theory by demonstrating that proximal and heightened feelings experienced during exercise are given more weight when an individual recalls an experience. Numerous studies have since corroborated this “peak-end rule” by manipulating pain or discomfort experienced during a behavior and assessing individuals’ recollection of that behaviour or event afterward (Kemp, Burt & Furneaux, 2008; Stone, Schwartz, Broderick & Shiffman, 2005; Redeilmeier & Kahneman, 1996; Schreiber & Kahneman, 2000). Brewster et al. (2000), for example, found that lowering the intensity of exercise at the end of an exercise bout made it less aversive and, thereby, a more attractive future behaviour. Enjoyment can be considered a cognitively processed product of recalled affective responses because it takes an entire exercise experience and its outcomes into account.

1.7.3 Outcome-derived Affect

Pleasure derived from exercise outcomes may also contribute to individuals’ decisions to pursue or avoid exercise as a product of affect magnitude and temporality (Milkman, Rogers, & Bazerman, 2008). Affect magnitude is the degree of pleasure or displeasure that outcomes elicit, whereas temporality is the time that it takes for outcomes to transpire (Milkman, Rogers, & Bazerman, 2008). Outcomes that elicit more pleasure in the near future greater encourage

behaviour greater discourage behaviour than those in the distant future (Milkman, Rogers, & Bazerman, 2008). Meanwhile, outcomes that elicit more displeasure in the near future greater discourage behaviour than those in the distant future (Milkman, Rogers, & Bazerman, 2008). Magnitude and temporality of pleasure derived from exercise outcomes may, hereby, explain why people plan to engage in exercise but choose to do something else when presented with a more pleasurable alternative like television-watching.

1.7.4 Dual Cognitive Systems

Cognitive systems used to consider recalled affective responses and outcome-derived affective responses, and the circumstances in which these considerations are made can bias decisions to pursue or avoid exercise (Kahneman, 2011). Brain imaging has shown that one cognitive system (System 1) is predominantly used to contemplate the pursuit or avoidance of behaviour with immediate outcomes, and that another system (System 2) is predominantly used to contemplate the pursuit or avoidance of behaviour with short or long-term outcomes (McClure, Laibson, Loewstein, & Cohen, 2004). System 1 is comprised of lower cognitive processes that operate quickly and subconsciously on intuition so lead to heuristic-biased decisions if recalled experiences are available, relevant information is salient, or norms are ingrained (Dolan, Hallsworth, Halpern, King, & Vlaev, 2010; Duhigg, 2012; Kahneman, 2011; Tversky & Kahneman, 1974). Contrarily, System 2 is comprised of higher cognitive processes that operate slowly and consciously through analysis so lead to more rational decisions, unless they are subjected to a time-constraint or exposed to extrinsic variables (Kahneman, 2011). Evaluation biases may, hereby, explain why people choose to engage in exercise but do not when they feel rushed or tired.

1.8 Pleasurable Physical Activity

More research is needed to understand how aforementioned concepts independently and collaboratively influence the pleasure-behaviour relationship for exercise, but sufficient evidence exists to guide the reconstruction of exercise.

Researchers have begun to devise exercise interventions that evoke pleasure or, at the very least, reduce displeasure in order to improve exercise attrition and adherence. Examples of these interventions include individualized exercise prescriptions, distractions from exercise, and exercise-contingent rewards.

1.8.1 Individualized Exercise Prescription

According to the circumplex model, core affect consists of two orthogonal and bipolar dimensions: affective valence (*positive, negative)* and perceived activation *(high, low),* that produce four affective states (Figure 1) (Russell, 1980). Affective valence is the degree to which something is perceived as pleasurable or displeasurable, whereas perceived activation is the degree to which something evokes a high or low level of arousal (Russell, 1980). Both dimensions correlate with physical activity intensity relative to the ventilatory threshold (VT), the point at which carbon dioxide production increases disproportionately to oxygen consumption (Ekkekakis & Lind, 2005). Affective valence is uniformly positive below the VT, variable proximal to the VT and uniformly negative above the VT during exercise; and perceived activation is uniformly low below the VT, variable proximal to the VT and uniformly high above the VT during exercise (Figure 2) (Ekkekakis & Lind, 2005). Affective valence and perceived activation are particularly variable proximal to the VT for inactive adults and children (Sheppard & Parfitt, 2008; Welch, Hulley, Ferguson, & Beauchamp, 2007; Ekkekakis, Hall, & Petruzzello, 2004).

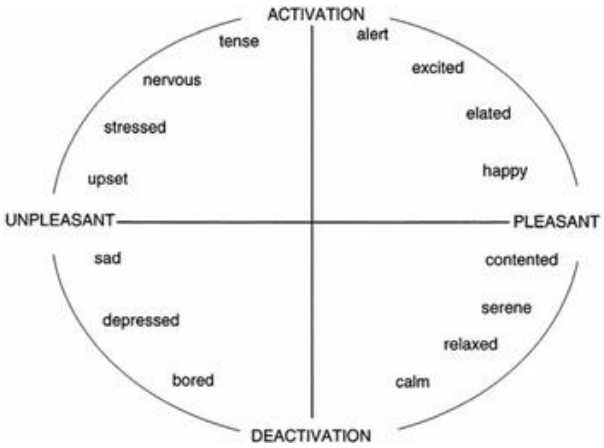

Figure 1: *Graphical representation of the circumplex model*

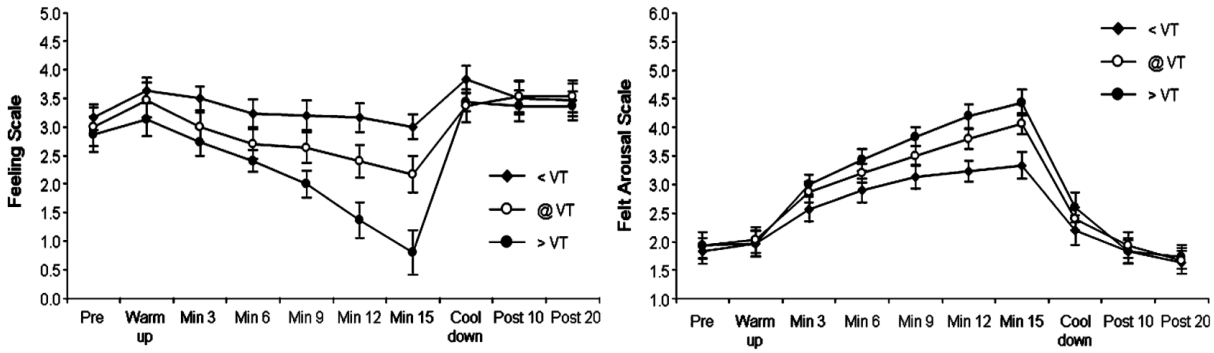

Figure 2: *Stylized representation of affective valence and perceived activation across an exercise bout below, proximal to and above the VT*

A pleasant high arousal state is considered the most desirable response to exercise, so exercise professionals are advised to prescribe aerobic physical activity below the VT or encourage individuals to exercise at an intensity that feels "comfortable"; especially since inactive and deconditioned individuals can reach or superseded their VT using oxygen consumption and heart rate parameters for moderate to vigorous physical activity (Garber et al., 2011; Welch, Hulley, Ferguson, & Beauchamp, 2007).

1.8.2 Exercise Distractions

The dual-mode theory postulates that affective valence and perceived activation are influenced by cortically mediated cognitive processes and ascending interoceptive cues, and that these variables influence affect in variable amounts depending on the intensity of physical activity (Ekkekakis, 2008; Rose & Parfitt, 2007). Cognitive processes, like self-efficacy and self-presentation concerns, are mainly positive below the VT but become more negative proximal to the VT, as individuals' abilities are challenged (Ekkekakis, 2008; Rose & Parfitt, 2007). They are theorized to contribute low-to-moderate levels at intensities below the VT and remain dominant as exercise intensity approaches the VT. Interoceptive cues, like ventilation and acidosis, are mainly positive below the VT but become more negative proximal to and above the VT, as homeostasis is challenged (Ekkekakis, 2008; Rose & Parfitt, 2007). They become

prominent proximal to the VT as metabolic processes become anaerobic and become dominant above the VT (Ekkekakis, 2008; Rose & Parfitt, 2007).

External stimuli can improve affective responses to exercise by distracting from internal stimuli. According to Rejeski's (1985) parallel processing theory, external stimuli are processed simultaneously and are in continuous competition for attention until one becomes more salient than the other. Two comprehensive reviews have shown music to distract from cognitive appraisals and/or internal cues and enhance affective responses to exercise below, proximal to and above the VT, with greatest effects occurring during self-paced exercise (Karageorghis & Priest, 2012a; Karageorghis & Priest, 2012b). More recent research, comparing the effects of various dissociative techniques on aforementioned psychological variables, has found music-videos to elicit the greatest dissociation and most desirable affective responses (Hutchinson, Karageorghis, & Jones, 2015). It is presumed that music-video combinations, like music-videos and television, have these effects because they consist of multiple stimuli so require more cognitive processing (Rees, Frith, & Lavie, 1997).

Exercise professionals are, therefore, advised to encourage the pairing of music-video combinations or music with exercise in order to improve individuals' affective responses to exercise.

1.8.3 Exercise-contingent Rewards

Making access to stimuli that elicit pleasure in the near future contingent upon the performance of exercise may encourage exercise. Saelens and Epstein (1998) provided partial support for this theory by demonstrating that restricting access to television through physical activity increased children's engagement in physical activity. The intervention's effect on children's fondness for physical activity was not examined though, so no deductions could be made about intervention effects on exercise-related affect (Saelens & Epstein, 1998). Faith (2001) and Goldfield (2013) reproduced Salens and Epstein's findings by restricting obese children's television-watching to cycling on a stationary bike,

and restricting obese and overweight children's television-watching through physical activity respectively. In addition to demonstrating that a physical activity-contingency increased obese children's engagement in physical activity, Goldfield (2013) demonstrated that it increased children's enjoyment of physical activity to a near significant level without adversely affecting their fondness for television.

Pairing exercise-contingent rewards, like television, with exercise execution may further encourage exercise by optimizing individuals' affective responses to exercise and exercise outcomes. Milkman et al. (2013) increased gym attendance by restricting access to a "page-turner audiobook" to the gym, and 61% of participants even opted to pay for continued restriction of audiobook access to them gym.

1.9 Purpose of Study

The purpose of this pilot study was to examine the effect that a dissociative technique had on psychological variables that describe individuals' exercise experience and exercise plans, when it was encouraged to be used as a reward for engagement in continuous, aerobic exercise. More specifically, this study examined the effects that watching consecutive episodes of a television show during treadmill walking below the VT has on:

1. Affective valence and perceived activation before, during and after treadmill walking, and enjoyment after treadmill walking;
2. Attentional focus during treadmill walking, and intention to bundle television-watching with treadmill walking in the future after intervention exposure.

Results will substantiate physically inactive individuals' affective responses to continuous, aerobic exercise below the VT, and inform the conduct of a longitudinal study examining the intervention's effect on psychological variables and exercise. The intervention's effect size and variation in effect size are unknown, as no studies that encouraged the restriction of television-watching access to exercise have assessed its effects on affective variables. This information is integral to calculating the sample size

for a well-powered study and is, therefore, considered a valid reason for executing a pilot study (Arain, Campbell, Cooper, & Lancaster, 2010; Thabane et al., 2010). To further inform the conduct of such a study, methodological issues will also be noted and discussed.

Chapter 2

2 Literature Review

No studies have examined the effects of restricting television-watching to continuous, aerobic exercise below VT on affect, attention, and intention. Consequently, no studies have examined the effects of watching consecutive episodes of a television show during this type of exercise, at this intensity, on these outcomes.

One study has, however, examined the effects of watching television during continuous, aerobic exercise below VT on affective valence and enjoyment, and four studies have examined the effects of watching television during continuous, aerobic, moderate-intensity exercise on affective valence, enjoyment, affective valence-related outcomes and perceived-activation related outcomes (Casilio, 2012; Miller, Hall, & Bailey, 2016; Overstreet et al., 2017; Rider, 2015; Swank, 2016). One of these studies has also examined the effects of watching television during moderate, aerobic exercise on an attentional focus-related outcome (Rider, 2015). Their results can, therefore, indicate what effects television watching may have on affective valence before, during and after exercise below VT, enjoyment after exercise below the VT, and attentional focus during exercise below VT.

As no studies have examined the effects of watching television during continuous, aerobic exercise on perceived activation, studies that have examined the effects of watching music-videos during aerobic exercise below VT on perceived activation and other affective variables may be used to indicate what effects watching television has on perceived activation before, during and after exercise below VT (Hutchinson, Karageorghis, & Jones, 2015). No studies have examined the effect of watching television or video during continuous, aerobic exercise on intention to bundle. As affective responses to exercise are theorized to contribute to or dictate individuals' decisions to pursue or avoid behaviour, intention to bundle can be assumed to correlate with intervention effects on affective responses to exercise.

2.1 Effects of Watching Television during Continuous, Aerobic Exercise below VT on Affect

2.1.1 "Effects of Television on Enjoyment of Exercise in College Students"

This cross-over study examined the effects of watching video (a nature program) and no video during 30 minutes of cycling at 40% of peak oxygen uptake (VO_2 peak) on affective valence and enjoyment (Overstreet et al., 2017). VO_2 peak, maximum rate of oxygen consumption was determined during a max stress test on a cycle ergometer before exercise sessions (Overstreet et al., 2017). Exercise sessions (n=2) took place at least 48 hours apart, within one week, and were counterbalanced to reduce order effect (Overstreet et al., 2017). Participants watched the first 30 minutes of BBC's Life during the video session, while participants watched no video during the no-video session (Overstreet et al., 2017). Affective valence was assessed every 10 minutes during exercise using Hardy and Rejeski's (1989) Feeling Scale (FS), and enjoyment was assessed after exercise using the 18-item Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991; Overstreet et al., 2017).

Participants (n=43) were predominantly female (65%), 19 $\pm$ 2 (mean $\pm$ SD) years old, in college and physically inactive, and had a BMI of 23.7 $\pm$ 3.2 (mean $\pm$ SD), no contraindications to exercise and no visual or hearing impairment (Overstreet et al., 2017). Paired sample t-tests revealed that mean affective valence and enjoyment were significantly greater with video than without (Overstreet et al., 2017). Bivariate correlational analyses revealed that mean affective valence during exercise, with and without video, was correlated with enjoyment of exercise, with and without video Overstreet et al., 2017). Finally, a two-way ANOVA revealed that enjoyment of exercise, with and without video, was significantly correlated with intrinsic motivation, suggesting that intrinsic motivation mediated video's effects on enjoyment of exercise (Overstreet et al., 2017). In summary, watching television during continuous,

aerobic, moderate-intensity exercise had a positive effect on affective valence during exercise and enjoyment after exercise.

Study findings demonstrate that television can improve affective responses to exercise below VT using validated and endorsed assessment tools, but do not substantiate the theory that these effects are attributable to dissociation. VO_2 peak is an approximate for VT but, nevertheless, accounts for exercise intensity effects on affective responses by using it to determine exercise parameters. Using participants as their own control also accounted for inter-individual differences in affective responses to exercise. The decision to use a nature program as an external stimulus, however, may have dampened intervention effects because nature programs and television shows consist of different characteristics (e.g., plots, characters) and content (e.g., violence, romance) so are likely to evoke different affective responses. Exercising with video before exercising without may have also confounded results if participants contrasted recalled with current affect when they reported "how they are feeling". The study's intervention would be expected to generate more valid and optimal results by using VT to determine exercise parameters, and using a television show and standardizing its content, as long as restricting television to exercise does not mediate television effects.

2.2 Effects of Watching Television during Continuous, Aerobic Exercise on Affect and Attention

2.2.1 "Psycho-Physiological Effects of Television Watching during Exercise"

This randomized crossover study examined the effects of watching self-selected video (television show), standardized video (nature program) and no video during 30 minutes of treadmill walking at 50% of heart rate reserve on affective valence, enjoyment and attention (Rider, 2015). Exercise sessions (n=3) took place at the same time of day, 48 hours apart, and were counterbalanced to reduce order effect (Rider, 2015). Participants watched one of their three favourite televisions shows on Amazon Prime or Netflix during the self-selected video

session, the first 30 minutes of BBC's Life during the standardized video session and no video during the no video session (Rider, 2015). Affective valence and perceived activation were assessed every 10 minutes during exercise sessions using Hardy and Rejeski's (1989) Feeling Scale (FS) and Svebak and Murgatroyd's (1985) Felt Arousal Scale (FAS); attention on the television show and walking were assessed every 10 minutes during exercise sessions using two Visual Analog Scales (VAS); and enjoyment of exercise was assessed after walking bouts using the 18-item Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991; Rider, 2015).

Participants (n=28) were predominantly female (80%), 30-60 years of age and physically inactive, and had a BMI of 18.5-44.0 and no injury or physical activity restrictions (Rider, 2015). One two-way (condition x time point) repeated measures ANOVA revealed that self-selected and standardized videos evoked more positive affective valence than no video, but only self-selected video evoked significantly more positive affective valence than no video (Rider, 2015). A two-way (condition x time point) repeated measures ANOVA revealed that self-selected and standardized video did not evoke greater perceived activation than no video, and a one-way ANOVA revealed that self-selected and standardized videos evoked greater enjoyment than no video (Rider, 2015). Finally, a two-tailed t-test revealed that self-selected and standardized videos evoked more dissociation than no video, but only self-selected videos evoked significantly more dissociation than no video (Rider, 2015). In summary, self-selected and standardized video had positive effects on affective valence, enjoyment and attention, and self-selected video generated superior effects on affective valence.

Study findings substantiate the theory that television can act as a distraction from continuous, aerobic exercise and improve affective responses to exercise using some validated and endorsed assessment tools. Study findings, furthermore, suggest that self-selected video evokes superior effects to standardized video. Participants were used as their own control to account for any inter-individual differences in affective responses to exercise, but the effects of

exercise intensity on affective responses were not accounted for so may have mediated results. The decision to use different types of video in self-selected and standardized conditions and participants' mean BMI may have also confounded results. Television shows and nature programs consist of different characteristics (e.g., plots, characters) and content, which may elicit different affective responses. Similarly, obese-individuals have reported different affective responses during the later stages of continuous, aerobic exercise at intensity. It is, furthermore, possible that watching television and/or nature programming during exercise before exercising without a distraction may have also confounded results if participants' contrasted recalled affect with current affect when they reported "how they are feeling". The study's intervention would be expected to generate more valid but similar results to the standardized condition by excluding obese individuals, using VT to determine exercise parameters, using a television show, and using validated and endorsed assessment tools, as long as restricting television to exercise does not mediate television effects.

2.2.2 "The Influence of Various Distraction Stimuli on Affective Responses during Recumbent Cycle Ergometry"

This randomized cross-over study examined the effects of listening to self-selected music, watching self-selected video and no distraction during 30 minutes of cycling at a self-selected intensity on affective valence (Miller, Hall, & Bailey, 2016). Exercise sessions (n=3) took place a week apart, at the same time, and were randomized to reduce order effect (Miller, Hall, & Bailey, 2016). As participants did not know which condition they would receive until they arrived, they were instructed to bring music and video selections with them to all exercise sessions (Miller, Hall, & Bailey, 2016). Participants listened to self-selected music during the music session, watched a self-selected television series or movie during the video session, and looked at an unpowered television screen during the no distraction session (Miller, Hall, & Bailey, 2016). Affective valence was assessed before warm-up, every 10 minutes during exercise, immediately after exercise and 10 minutes after passive recovery using Hardy and Rejeski's (1989)

Feeling Scale (FS; Miller, Hall, & Bailey, 2016). Participants were permitted to change exercise intensity during the 5 minutes of exercise, and every 5 minutes thereafter (Miller, Hall, & Bailey, 2016).

Participants (n=25) were predominantly male (56%), 20.3 $\pm$ 1.4 (mean $\pm$ SD) years old, in college, and healthy. Males had a BMI of 24.3 $\pm$ 2.7 (mean $\pm$ SD), whereas females had a BMI of 21.9 $\pm$ 1.4 (mean $\pm$ SD) (Miller, Hall, & Bailey, 2016). A two-way (condition x time during exercise) ANOVA revealed a significant main effect for condition, due to affective valence being greater for video and music than no distraction (Miller, Hall, & Bailey, 2016). Another two-way (condition x time before and after exercise) ANOVA revealed a significant main effect for time, with affective valence 10 minutes after passive recovery being significantly more positive than affective valence before exercise (Miller, Hall, & Bailey, 2016). Study results, overall, demonstrated that self-selected music and video had significant positive effects on affective valence during and after exercise, and that self-selected video evoked more positive effects than music.

Study findings substantiate the theory that television can improve affective responses to continuous, aerobic exercise using a validated and endorsed assessment tool, but do not substantiate the theory that these effects are attributable to dissociation. Participants were used as their own controls to account for any intra-individual differences in affective responses, but exercise intensity was not controlled for so it may have mediated results. The decision to use different types of video in self-selected and standardized conditions may have also confounded results. Movies share many of the same characteristics as television shows but consist of different content and are capable of greater character development, greater plot complexity, etc. due to their duration, so they may evoke slightly different affective responses. Participants' inability to finish a movie during the exercise session may have influenced affective valence near the end of and after the exercise as well. This study's intervention would be expected to generate more valid results but less optimal results than the self-selected

television condition by using VT to determine exercise parameters, assessing intra-individual changes in affective responses, using validated and endorsed assessment tools and standardizing television content, particularly if the restriction of television watching to exercise mediates television effects.

2.2.3 "The Effects of Watching Television during Exercise"

This randomized control study examined the effects of watching television and no television during 15 minutes of treadmill walking or running at a self-selected speed on enjoyment and attention (Casilio, 2012). Participants were matched on age and gender before being randomized to experimental or control groups because older age is correlated with shorter walking/running distance and men run faster than women (Casilio, 2012). Participants in the experimental group watched a self-selected channel, while participants in the control group looked forward (Casilio, 2012). Exercise sessions (n=3) took place in a gym on different days, at the same time, and consisted of a 5-minute warm-up, 15-minute endurance and 5-minute cool-down (Casilio, 2012). Attention was assessed at the 2^{nd}, 5^{th}, 8^{th}, 10^{th}, 13^{th} and 15^{th} minute mark during endurance using Baden, McLean, Tucker, Noakes and Gibson's (2005) Association Thought Scale, and enjoyment of treadmill/walking was assessed immediately after exercise using a 10-point Likert scale (Casilio, 2012).

Participants (n=42) were predominantly female (52%), 44 (mean) years old, of various heights and weights, from different backgrounds, healthy, able to exercise, untrained runners and fitness members at the same gym in Rochester, New York (Casilio, 2012). A one-way, repeated measures MANOVA revealed a non-significant session effect for all measures, except distance, so the average of outcomes reported during sessions was used in subsequent analyses (Casilio, 2012). A one-way, between-subjects MANOVA revealed a significant main effect for television on all Association Thought Scale responses, except the 2-minute mark, and a significant main effect of television on enjoyment of exercise (Casilio, 2012). A 2x6 mixed-model MANOVA revealed a significant main, condition effect; significant, main minute mark effect and significant interaction

between television and minute mark (Casilio, 2012). To summarize, watching a self-selected television channel had a significant positive effect on enjoyment after exercise and attention over the course of exercise.

Study findings substantiate the theory that television can act as a distraction from continuous, aerobic exercise and improve affective responses to exercise using validated assessment tools. Inter-individual differences and exercise intensity effects on affective responses were not controlled for though so may have confounded results despite outcomes' good reliability. The decision to allow participants to self-select a television channel and conduct the study in a gym may have also confounded results. Different television show content and advertisements may evoke different affective responses for previously mentioned reasons, and different start and end times may evoke different affective responses because dissociation exerts greater influence on affective responses during later stages of exercise. Movement, noise and awareness of others may have also evoked different affective responses by distracting participants in the experimental group from watching television. The study's intervention would be expected to generate more valid and less optimal than or similar results to the self-selected television condition by minimizing distractions in the environment, using VT to determine exercise parameters, using a television show and standardizing its content, and using validated and endorsed tools, as long as restricting television watching to exercise does not mediate television effects.

2.2.4 "The Effect of Music and Television Viewing on Enjoyment during Aerobic Exercise"

This randomized, cross-over study examined the effects of watching self-selected video and music, and no distraction during 30 minutes of treadmill walking or elliptical ambulating at a self-selected intensity on feeling states and enjoyment (Swank, 2016). Exercise sessions (n=3) were scheduled based on participants and researchers' availability (Swank, 2016). Participants did not know which condition they would receive until they arrived so were instructed to bring music and video selections with them to exercise sessions or be ready to

watch television on the treadmill or elliptical (Swank, 2016). Participants watched a self-selected television channel, television show or movie during the self-selected video session, listened to self-selected music in the self-selected music condition and had no distraction during the no distraction condition (Swank, 2016). Affective states and enjoyment were assessed after cool-down using Gauvin and Rejeski's (1993) Exercise Feeling Induced Scale (EFI) and a modified version of the Physical Activity Enjoyment Scale (PACES; Swank, 2016).

Participants (n=30) were predominantly female (53%), 21.1 $\pm$ 2.04 (mean $\pm$ SD) years old, university students, healthy, and had a BMI of 24.38 $\pm$ 2.68 (mean $\pm$ SD) and no contraindications to exercise (Swank, 2016). Repeated measures ANOVAs revealed a significant difference in overall PACES, positive affect, negative affect and fatigue; no significant difference in tranquility was found (Swank, 2016). Post-hoc t-tests revealed that the no distraction condition had a higher PACES enjoyment score than the video session, the video session had a significantly greater positive affect score than the music session, and the video session had a significantly lower fatigue score than the music session (Swank, 2016). To summarize, the study found that self-selected music had significant, positive effects on positive affect, negative affect and tranquility, television had significant negative effects on enjoyment, and television evoked superior effects to music for all outcomes.

Study findings provide partial support for the theory that video greater improves affective responses to continuous, aerobic exercise than music using validated tools, but do not substantiate the theory that these effects are attributable to dissociation. Participants were used as their own control so inter-individual differences in affective responses to exercise were accounted for, but exercise intensity and mode were not controlled for so may have confounded results. The decision to allow participants to self-select television or video may have also confounded results for previously mentioned reasons. It is interesting to note that enhancement of positive affect, negative affect and tranquility did not correspond

with an improvement in exercise enjoyment but, rather, a reduction of exercise enjoyment. This is may be due to the use of a modified version of the Physical Activity Enjoyment Scale. The study's intervention would be expected to generate more valid and less optimal results than the self-selected condition by using VT to determine exercise parameters, utilizing a television show and standardizing its content, validated and endorsed materials, particularly if restricting television watching to exercise mediates television effects.

2.3 Effects of Music-Videos during Continuous, Aerobic Exercise below VT on Affect and Attention

2.3.1 "Psychological Effects of Music and Music-Video during Treadmill Running"

This cross-over study examined the effects of listening to music, watching music-videos and having no distraction during 15 minutes of treadmill walking or running 10% below VT and 10% above VT on affective valence, perceived activation and attentional focus (Hutchinson, Karageorghis, & Jones, 2015). VT was determined during a max stress test on a treadmill using indirect calorimetry before exercise sessions, and participants completed a habituation session within 48 hours of the first exercise session (Hutchinson, Karageorghis, & Jones, 2015). Exercise sessions (n=3) took place 48-72 hours apart, at the same time, over the course of three weeks, and were counterbalanced to reduce order effect (Hutchinson, Karageorghis, & Jones, 2015). Participants listened to a 15-minute playlist of peer-selected songs that had 128-132 bpm and scored 30-32 on Brunel's Music Inventory-3 during the music condition, and watched and listened to the music-videos for the same playlist during the music-video condition (Hutchinson, Karageorghis, & Jones, 2015). The order of songs and music-videos was randomized to reduce order effect. Affective valence, perceived activation and attentional focus were measured before exercise, just prior to the 5^{th}, 10^{th} and 15^{th} minute of exercise and after cool-down using Hardy and Rejeski's (1989) Feeling Scale (FS), Svebak and Murgaroyd's (1985) Felt Arousal Scale (FAS)

and Tammen's (1996) Attention Scale (AS; Hutchinson, Karageorghis, & Jones, 2015).

Participants (n=24) were predominantly male (58%), 21.3 ± 3.9 (mean ± SD) years old, healthy, university students, and had a BMI of 23.55 ± 2.14 (mean ± SD) and VO_2 max of 53.82 ± 7.90 (Hutchinson, Karageorghis, & Jones, 2015). A three-way MANOVA revealed a two-way interaction for affective valence during exercise below VT and higher-order interaction for perceived activation during exercise above VT (Hutchinson, Karageorghis, & Jones, 2015). A main condition effect for in-task affective valence and perceived activation, an intensity main effect for in-task affective valence, and main time effect for in-task perceived activation were also found (Hutchinson, Karageorghis, & Jones, 2015). A three-way MANOVA revealed a higher-order interaction for affective valence below VT, and main condition and time effects for affective valence pre-post task (Hutchinson, Karageorghis, & Jones, 2015). Lastly, a three-way MANOVA demonstrated that attention scores were positively correlated with in-task valence below VT for music and music-video conditions (Hutchinson, Karageorghis, & Jones, 2015). In summary, music and music-videos evoked more positive affective valence and perceived activation during and after exercise, and more dissociation during exercise; with music-videos evoking the greatest effects.

Study findings substantiate the theory that television can act as a distraction from continuous, aerobic exercise and improve affective responses to exercise using validated and endorsed assessment tools. Participants were used as their own control and exercise was made relative to the VT so inter-individual differences in affective responses to exercise and intensity effects on affective responses were accounted for. Music and music-videos were standardized, and consisted of the same musical content. Other confounding factors, like the motivational aspects of music, were also controlled for. However, it is possible that watching and listening to music-videos and listening to music during exercise before exercising without a distraction may have also confounded results if participants' contrasted recalled affect with current affect when they reported

"how they are feeling". The study's intervention would be expected to generate more valid and similar results to the music-video condition if the restricting television to exercise does not mediate effects.

2.4 Summary of Relevant Research

The majority of reviewed studies were designed to examine the effects that watching television during continuous, aerobic, moderate-intensity exercise has on affect. Those that were not examined the effects of watching video or listening to music during exercise at intensities relative to the VT.

Of the affective responses examined, affective valence or affective valence-related outcomes and enjoyment were the most frequently assessed, and perceived activation or perceived activation-related outcomes were the least frequently assessed. Affective valence was typically assessed during the endurance portion of exercise sessions using Hardy and Rejeski's (1989) Feeling Scale (FS), whereas enjoyment was typically assessed using the Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991) after exercise. Various physical activities: treadmill walking, treadmill sprinting, elliptical ambulation and cycling, were structured as exercise, and various external stimuli: television channel, television shows, movies, music-videos and music were used as a distraction. Adding further complexity to interventions, some external stimuli were self-selected and susceptible to change over the course of and/or between exercise sessions.

2.4.1 Study Hypotheses

Despite their differences, reviewed studies collectively indicate that watching consecutive episodes of a television show during treadmill walking below the VT might:

1. a) Evoke more positive affective valence during warm-up, endurance and cool-down, and after exercise;
1. b) Increase perceived activation during warm-up, endurance and cool-down, and after exercise;
1. c) Increase enjoyment after cool-down and exercise;

2. a) Evoke higher attentional focus (i.e., more dissociation) during warm-up, endurance and cool-down
2. b) Increase intention to bundle television watching with exercise in the future

Discrepancy between expected and observed outcomes would likely be attributable to the restriction of television watching to exercise, unless there is reason to suggest otherwise.

It is important to examine intervention effects on these affective variables at these time points because television-watching is a pervasive and attractive sedentary behaviour; affective variables are theoretically and statistically correlated with future physical activity; and affective responses at these time points likely contribute to individuals' recalled exercise experience. Treadmill walking poses as the most suitable physical activity for watching television during aerobic exercise because it involves little cognitive effort and vertical displacement, and will not cause individuals to supersede their VT if its intensity is prescribed or monitored.

Chapter 3

3 Methods

The study's protocol and materials underwent full board review, and were approved by the University of Western Ontario's Health Sciences' Research Ethics Board in March 2017 (Appendix A). Recruitment began in March 2017 and continued until data collection concluded in June 2017, at which point treatment's effects on primary and secondary outcomes were analyzed.

3.1 Sample

Prime candidates were physically inactive individuals that planned to become physically active in the near future by engaging in regular exercise because this intervention would, ideally, support their uptake and maintenance of exercise. Inclusion and exclusion criteria were enforced to minimize the confounding effects of extraneous variables on outcomes of interest.

3.1.1 Eligibility Criteria

Individuals had to be English-speaking, 18-35 years of age, in post-secondary education, engaging in less than 150 minutes of moderate-to-vigorous physical activity per week, exercising less than 2 times per week, and intending to exercise regularly in the near future in order to participate. The language restriction was imposed to assure that participants provided informed consent, complied with procedure instructions, and appreciated television show content. Age and education restrictions were imposed to minimize the effect that social and environment differences could have on participants' intention to bundle television-watching with exercise. Physical activity and intention restrictions were imposed to minimize the mediating effect that fitness and behavior differences could have on participants' affective responses to exercise tests, and intention to bundle television-watching with exercise.

Individuals that had a cardiovascular respiratory, musculoskeletal, metabolic or mental health condition, had an ailment or injury restricting physical

activity, had moderate to severe vision, hearing or cognitive impairment, had an obese BMI, were pregnant, had severe hypertension or were taking medication were not allowed to participate in the study. Health, weight, pregnancy, blood pressure and medication restrictions were imposed because these conditions and substances would have increased individuals' risk of incurring adverse outcomes during the max stress test and exercise tests, and influenced max stress test outcomes (ACSM, 2013). Other condition, ailment and injury restrictions were imposed because they would have influenced max stress test outcomes.

3.1.2 Sample Size

No sample size calculation was computed because this was a pilot study. The study's sample size depended on the success of participant recruitment.

3.2 Outcomes

Primary outcomes: affective valence, perceived activation and enjoyment, were assessed approximately two days apart, at the same time, with and without the intervention (i.e., at baseline and outcome) using validated questionnaires to test the study's primary hypotheses. Secondary outcomes: attentional focus and intention to bundle television-watching with exercise, were assessed at baseline and treatment using validated and self-developed questionnaires to respectively test the study's secondary hypotheses. Other outcomes: sex, age, BMI, health status, physical activity levels, exercise and television-watching habits, were assessed before baseline using a validated questionnaire and self-developed questionnaires to confirm study eligibility, calculate exercise intensities, describe the sample, and control mediation of intervention effects if appropriate.

3.2.1 Primary Outcomes

Affective valence was measured before exercise, during exercise, during the last 15 seconds of the 5-minute warm-up, 15 seconds before the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute of endurance, during the last 15 seconds of the 5-minute cool-down, and 10 minutes after exercise at baseline and treatment using the

Feelings Scale (FS) in order to assess individuals' immediate and unprocessed feelings about exercise, across the exercise bout (Hardy & Rejeski, 1989). The FS is a single-item, 11-point bipolar scale used to assess the hedonic tone dimension of the circumplex model. It ranges from -5 to +5, with anchors at 0 (*neutral*) and every odd integer (*very bad – very good*) (Appendix B). Participants were familiarized to the FS during the first laboratory visit, and prompted to verbally report their affective valence during their second and third laboratory visits (i.e., at baseline and treatment) when asked "how do you currently feel". A paper version of the scale was provided upon inquiry. The FS has shown to have adequate convergent validity in college-aged males and females, and is commonly to assess how good/bad individuals feel before during, and after exercise (Hardy & Rejeski, 1989; Kenney, Rejeski, & Messier, 1987).

Perceived activation was measured at the same time points as affective valence: before exercise, during the last 15 seconds of the 5-minute warm-up, 15 seconds before the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute of endurance, during the last 15 seconds of the 5-minute cool-down, and 10 minutes after exercise at baseline and treatment, using the Felt Arousal Scale (FAS) in order to assess individuals' immediate and unprocessed feelings about exercise, across the exercise bout (Svebak & Murgatroyd, 1985). The FAS is a single-item, 6-point bipolar scale used to assess the activation dimension of the circumplex model. It ranges from 1 to 6, with anchors at every integer (*low arousal – high arousal*) (Appendix C). Participants were familiarized to the FAS during the first laboratory visit, and prompted to verbally report their perceived activation during the second and third laboratory visit when asked "estimate how aroused you actually feel". A paper version of the scale was presented upon inquiry. The FAS has shown to have satisfactory convergent validity with other measures of perceived activation, and is commonly to assess how aroused individuals feel before, during and after exercise (Sheppard & Parfitt, 2008).

Enjoyment was measured immediately after cool-down and 10 minutes after exercise at baseline and treatment using the Physical Activity Enjoyment

Scale (PACES) in order to assess delayed and processed individuals' feelings about the exercise bout, after the exercise bout (Kendzierski & DeCarlo, 1991). The PACES is an 18-item, 7-point, bipolar scale used to assess an emotion about physical activity associated with physical activity carried out to sustain or improve health and fitness. It ranges from 1 to 7, with anchors at every integer (*not at all*, *extremely*) (Appendix D). Participants were familiarized to the PACES during the first laboratory visit, and asked to "indicate how much [they] are enjoying this exercise session" during the second and third laboratory visit by circling the number associated with the anchor that best described their feelings toward exercise. Negatively-keyed items were reverse scored and scores were summed to give a total enjoyment score, with higher total enjoyment scores representing greater enjoyment of exercise. The PACES has been shown to have high validity and moderate reliability, and is commonly used to assess individuals' enjoyment of exercise after exercise (Kendzierski & DeCarlo, 1991).

3.2.2 Secondary Outcomes

Attentional focus was measured during the last 15 seconds of the 5-minute warm-up, 15 seconds before the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute of endurance, and during the last 15 seconds of the 5-minute cool-down using the Attention Scale (AS) to determine what individuals were focusing on, across the exercise bout (Tammen, 1996). The AS is a single-item, 2-point, bipolar scale used to establish what an individual is focusing on. It ranges from 0 to 20, with anchors at each end (*external focus, internal focus*), and provides examples of internal foci (*bodily sensations, heart rate, breathing, etc.*) and external foci (*daydreaming, external environment, etc.*) (Appendix E). Participants were familiarized to the AS during the first laboratory visit, and prompted to visually indicate what they were focusing on by demarcating the scale with an "X" when presented with a paper version of the scale. The distance between 0 and "X" was multiplied by 5 to give a score out of 100; scores less than or equal to 50 indicate an internal focus, while scores greater than 50 indicate an external focus. The AS is commonly used

to establish what individuals are focusing on during exercise, and has been shown to be a valid and reliable tool for such (Tammen, 1996).

Intention to bundle television-watching with exercise was measured approximately 10 minutes after exercise at treatment using a self-developed questionnaire called the Intention to Bundle Questionnaire (ITB) to assess individuals' plans to watch television during exercise in the future. The ITB is a 4-item, 7-point, bipolar scale used to assess plans to pair television-watching with exercise in the future. It ranges from 1 to 7, with anchors at every integer (*completely agree – completely disagree*) (Appendix F). Participants were asked to consider a scenario where they had access to a treadmill and monitor that allowed them to continue watching the study's television show while exercising, and describe their plans to watch this television show during exercise by circling the number associated with the most appropriate anchor at the end of the third laboratory visit. Resulting scores were tallied and averaged; a higher mean score represented a greater intention to bundle television-watching with exercise than a lower mean score. The ITB was developed for the purpose of this study so has not been tested for reliability or validity, but was developed by investigators using scale development guidelines (Hinkin, Tracey, & Enzy, 1997).

3.2.3 Other Outcomes

Age and sex were assessed before baseline using a sociodemographic form, a form that is typically used to obtain information that classifies individuals and facilitates communication. Participants were asked to complete this 7-item form at the beginning of their first laboratory visit in order to confirm study eligibility, establish their ventilatory threshold (VT), describe the sample, and mitigate the effects of any between-group differences on primary and secondary outcomes (Appendix G). It was developed for the purposes of this study so has not been tested for validity or reliability, but was created using questionnaire development guidelines and former sociodemographic forms (Diem, 2002).

Participants' health status and, thereby, physical activity readiness was assessed before baseline using the Physical Activity Readiness Questionnaire (PAR-Q+; Warburton, Jamnik, Bredin, Gledhill & PAR-Q+ Collaboration, 2011). The PAR-Q+ is a screening tool used to discern whether it is safe for individuals to engage in physical activity (Appendix H). Participants were asked to complete the PAR-Q+ at the beginning of their first laboratory visit in order to confirm study eligibility, describe the sample, and mitigate the effects of any between-group differences on primary and secondary outcomes. Those that answered "yes" to one or more of the first seven questions about their general health were prompted to answer more questions about disease signs and symptoms, and mental conditions. Participants that answered "yes" to one or more of these questions were not permitted to participate in fitness testing or exercise. The PAR-Q+ was developed by systematically reviewing 54,000 articles on exercise-related risks, and prompts physician consultation for a smaller proportion of individuals than the original Physical Activity Readiness Questionnaire, which generated many false positives (Warburton et al., 2011; Warburton, Jamnik, Bredin, & Gledhill, 2014).

Physical activity levels were assessed before baseline using the Godin-Shephard Leisure Time Physical Activity Questionnaire (GSLTPAQ; Godin & Shephard, 1985). The GSLTPAQ is a 4-item questionnaire used to subjectively assess the number of times mild, moderate and strenuous physical activity is performed for at least 15 minutes in a typical week. Examples of mild, moderate and strenuous leisure physical activity are provided (Appendix I). Participants were asked to complete the GSLTPAQ at the beginning of their first laboratory visit in order to confirm study eligibility, describe the sample, and mitigate the effects of any between-group differences on primary and secondary outcomes. Answers were multiplied by 3, 5 and 9 metabolic equivalents, and resulting scores were summed to classify individuals as insufficiently active ($\leq$ 23) or active ($\geq$ 24) (Amireault & Godin, 2015). The GSLTPAQ has been shown to have moderate validity and high reliability, and is commonly used to assess physical activity levels where objective physical activity assessment is infeasible (Godin &

Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993; Miller, Freedson, & Kline, 1994).

Exercise and television-watching habits were assessed before baseline using self-developed questionnaires called the Exercise and Television-Watching Habit Questionnaires (EHQ & TWHQ) to assess individuals' prevailing television-watching and exercise behaviours. The EHQ and TWHQ are 7 and 15-item questionnaires are used to evaluate exercise and television-watching history, preferences and plans (Appendix J). Participants were asked to complete the EHQ and TWHQ during the first laboratory visit in order to confirm study eligibility, describe the sample, and mitigate any confounding effects of between-group differences on primary and secondary outcomes. The EHQ and TWHQ were developed for the purpose of this study so have not been tested for reliability or validity, but were developed by in using questionnaire development guidelines (Keith, 2002).

3.3 Procedures

Participants were recruited through in-class recruitment sessions, poster advertisement and communication with the primary investigator (PI). Individuals that self-identified as eligible visited the Exercise and Health Psychology Laboratory (Room 408) in the Labatt Health Sciences Building at Western University (1121 Richmond Street, London, Ontario, Canada) to review the Letter of Information and Consent. Eligible participants that signed the consent form visited the EHPL three times within the next week or two weeks. The first laboratory visit comprised of a demographic assessment, max stress test and mock exercise test; the second laboratory visit comprised of a baseline exercise test; and the third laboratory visit comprised of a treatment exercise test. Laboratory visits were scheduled to take place two days apart, at the same time, to minimize intra-individual variability in psychological variables. If participants were unable to schedule or attend laboratory visits two days apart, at the same time, laboratory visits were scheduled to take place at participants' earliest convenience within the next week. Participants randomized to the experimental group were also asked to watch the

first episode of "How to Get Away with Murder" two days before the third laboratory visit. (See Figure 3 for a flow chart of aforementioned procedures.)

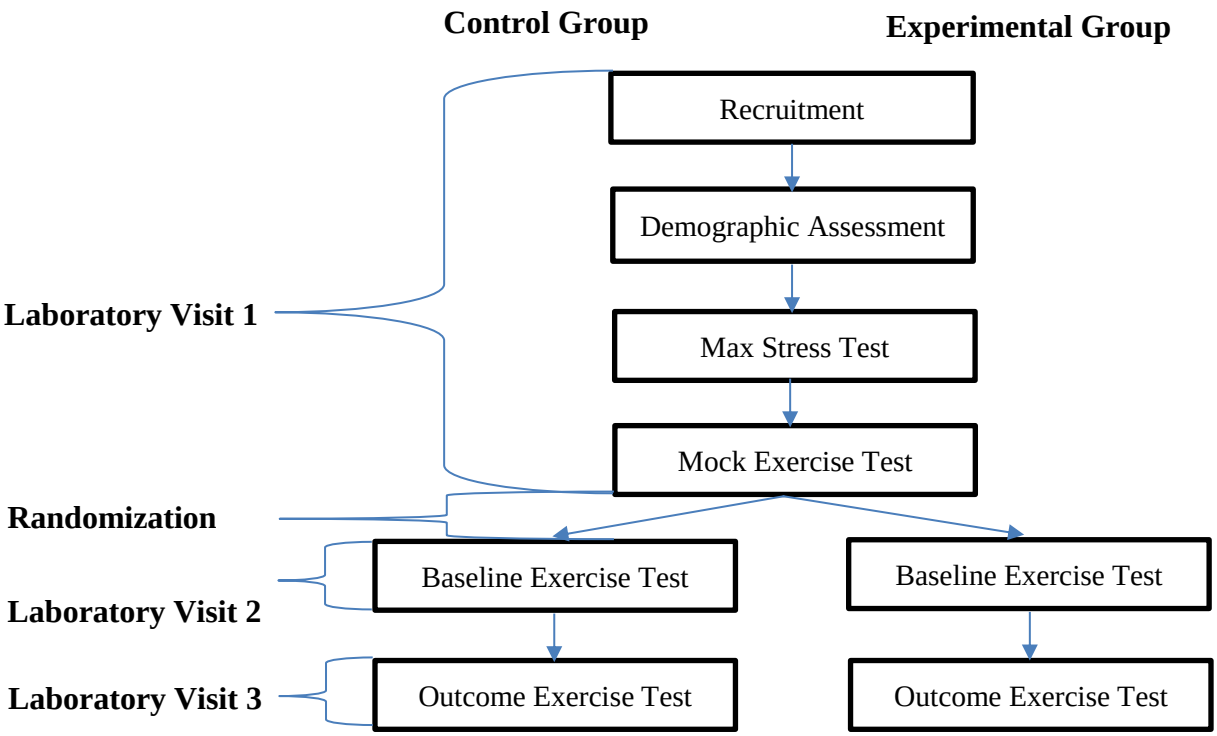

Figure 3: *Flow diagram of study procedures*

3.3.1 Recruitment

A standardized email was sent to instructors of winter and summer courses at the University of Western Ontario. The email outlined study objectives, procedures and outcomes, and asked for a couple minutes of class time to verbally advertise the study (Appendix K). Verbal advertisement was guided by a script and complemented by a poster, when audiovisual equipment was available. The script and poster provided an overview of the study's objectives and procedures, eligibility criteria and contact information (Appendices L and M). Posters were also displayed on bulletin boards across the school's campus, bulletin boards in local apartment buildings, grocery stores and coffee shops; the Facebook wall of open-access groups for different school programs; and the PI and PI friends' Facebook wall (Appendix N).

Individuals that expressed an interest in participating were sent a standardized email. The email described study objectives and procedures, and asked individuals to self-identify as eligible by answering questions about inclusion and exclusion criteria (Appendix O). Individuals that self-identified as eligible were scheduled to come into the Exercise and Health Psychology Laboratory in order to review the letter of information, answer questions about study procedures or participation outcomes, sign the consent form, and, if appropriate, start data collection (Appendix P). They were told to come to the Exercise and Health Psychology Laboratory dressed in comfortable clothing and athletic footwear, and to avoid consuming food, caffeine alcohol and tobacco 3 hours beforehand (ACSM, 2013).

3.3.2 Laboratory Visit 1: Demographic Assessment

Individuals that signed the consent form were asked to complete the sociodemographic form, PAR-Q+, GSLTPAQ, and EHQ and TWHQ.

Eligible participants removed their shoes, extra clothing and emptied their pockets before anthropometric measurements were taken. Participants' height and weight were measured using a calibrated scale and ruler (Health-o-meter Professional Eye Level Digital Scale with Adapter, model #500KLAD) to the nearest decimal point in order to calculate their body mass index (BMI) and confirm study eligibility, measure or predict their VT, describe the sample, and mitigate the effects of any between-group differences on primary and secondary outcomes. Participants' BMI was calculated by dividing their height by the square of their weight. Those with an obese BMI: BMI $\geq$ 30 kg/m^2, were prohibited from continuing because their health would predispose them to adverse events during the max stress test (ACSM, 2013).

Participants' sitting blood pressure (BP) was also assessed before participants were allowed to proceed. They sat upright in a chair, with their left arm supinated, while the PI fastened an adult-sized BP cuff around their left arm, placed the stethoscope on their antecubital space, below the cuff; pumped the

sphygmomanometer to 200 mmHg and slowly released air from the cuff (AMG Medical, Physio Logic Professional Deluxe Adult Sphygmomanometer). The first distinctive sound was recorded as participants' systolic BP, and the disappearance of sound was recorded as their systolic BP. Participants with severe hypertension: systolic BP $\geq$ 180 mmHg and diastolic BP $\geq$ 120 mmHg were prohibited from continuing because their health would predispose them to adverse events during the max stress, mock exercise and exercise tests (ACSM, 2013).

Lastly, participants' self-reported compliance with instructions to avoid food, alcohol, caffeine and tobacco 3 hours before the laboratory visit was checked before they were allowed to proceed. Those who failed to comply were obliged to reschedule the max stress and mock exercise tests.

3.3.3 Laboratory Visit 1: Max Stress Test

Participants were briefed on max stress procedures, fitted with a face mask and 12-lead electrocardiogram (Norav Medical 1200W PC-Based Stress Test; Cosmed V2 mask and headcap for Turbine 2000), and oriented to Borg's 15-point Rating of Perceived Exertion Scale before the max stress test (RPE; Borg, 1982). The face mask and electrocardiogram measured gas exchange and heart activity data, whereas the RPE was used to assess how strenuous the physical activity felt. The RPE is a single-item, 14-point, bipolar scale that ranges from 6 to 20, with anchors at 6, 7, 9, 11, 13, 15, 17 and 20 (*no exertion – maximal exertion*) (Appendix Q). Participants were told to verbally report their RPE when asked "how strenuous does it feel", and results were used to prompt verbal encouragement and corroborate volitional exhaustion: the point at which individuals feel that they are unable to continue. The validity and reliability of Borg's (1982) 15-point RPE Scale have been questioned, but it is used to monitor exercise tolerance in conjunction with objective exertion measures regardless (Lamb, Eston, & Corns, 1999; Chen, Fan, & Moe, 2002; ACSM, 2013).

The max stress test utilized a modified Balke protocol (ACSM, 2013). Participants began the exercise test by walking 2 mph on a treadmill with no

incline for 3 minutes (Woodway Bari-Mill). Treadmill speed was increased 1.3 mph 3 minutes later, and treadmill incline was increased 2.5% every 3 minutes thereafter. Treadmill speed was increased slightly if participants did not reach their maximal oxygen uptake (VO_2 max) in 8-12 minutes because longer max stress tests produce lower VO_2 values for physically inactive individuals (Buchfuhrer et al., 1983). Participants continued walking until volitional exhaustion or two of the standard criteria for reaching VO_2 max were observed: a peak or plateau in oxygen consumption preceded a decrease in oxygen consumption with increasing workloads, a respiratory ratio $\geq$ 1.1, and a maximal heart rate (ACSM, 2013). Participants concluded the max stress test by walking 2 mph on the treadmill with no incline for 3-5 minutes.

RPE, heart rate, and oxygen consumption and carbon dioxide exhalation were monitored throughout the max stress test to assure participants' safety, guide protocol adjustments, and establish their VT. Electrocardiogram data was monitored using a computer program that wirelessly registers electrocardiogram data (Norav Medical Stress PC ECG Application, Version 5.36; Norav Medical 1200W PC-Based Stress Test), whereas oxygen consumption and carbon dioxide exhalation were monitored using a computer program that manually registers metabolic cart data (Cosmed Quark b^2 Data Management Software, Version 9.1; Cosmed b^2 Metabolic Cart). Carbon dioxide exhalation was plotted against oxygen consumption to identify the VT as the tangential point in the carbon dioxide-oxygen relationship from the line of unity (Johnson & Taylor, 2004; K4 b2 User manual, IX Edition). If participants requested to stop the max stress test before this point was reached, data was projected to predict its value. A measured or predicted VT value was used to calculate warm-up, endurance and cool-down intensities for exercise tests.

3.3.4 Laboratory Visit 1: Mock Exercise Test

Participants were briefed on mock exercise test procedures, oriented to the FS, FAS, AS and PACES, and fitted with a chest heart rate monitor before the mock exercise test to familiarize them with exercise test procedures and

instruments. Recall that the FS and FAS are bipolar scales used to assess hedonic tone and activation dimensions of the circumflex model, AS is a bipolar scale used to determine what is being focused on, and PACES is a questionnaire used to assess how enjoyable participants found exercise. Participants verbally reported their affective valence and perceived activation before, during and after exercise by referring to the FS and FAS, visually reported their attentional focus during exercise by demarcating the AS, and visually reported their enjoyment after exercise by completing the PACES. A watch that wireless registers chest heart rate monitor data was used to assess heart rate at rest and monitor heart rate throughout exercise.

Participants began the mock exercise test by reporting their affective valence and perceived activation at rest, and walking 2 mph on a treadmill with no inline (Woodway ELG). Participants exercise at this intensity for 5 minutes and, during the last 15 seconds, reported their affective valence, perceived activation and attentional focus. Participants increased treadmill speed to elicit a "brisk" walking pace, while the PI increased treadmill incline 1%. Participants exercised at this intensity for 6 minutes and, during the last 15 seconds, reported their affective valence, perceived activation, and attentional focus. Participants reduced treadmill speed to 2 mph, while the PI reduced treadmill incline to 0%. Participants exercise at this intensity for 5 minutes and, during the last 15 seconds, reported their affective valence, perceived activation and attentional focus. Participants concluded the mock exercise test by sitting in a chair and completing the PACES.

Before participants left, they were instructed to avoid caffeine, alcohol and tobacco 3 hours before the next laboratory visit (ACSM, 2013).

3.3.5 Randomization

Participants were randomly allocated to experimental groups in blocks of two, using a random number generator. This block size was chosen to increase the likelihood of having an equal number of participants in both groups.

3.3.6 Laboratory Visit 2: First Exercise Test (Baseline)

The incline for warm-up, endurance and cool-down was calculated by substituting known values into ACSM's equation for gross VO_2 (walking) and isolating for incline. The endurance portion was meant to elicit oxygen consumption (VO_2) below the VT, so 90% of the VO_2 associated with VT was substituted for VO_2 and participants' "brisk" walking pace was substituted for speed. Hutchinson, Karageorghis and Jones (2015) previously classified 90% of the VO_2 associated with VT as exercise below VT. Warm-up and cool-down were meant to gradually increase and reduce exercise intensity, so 40% of the VO_2 associated with VT was substituted for VO_2 and 2 mph was substituted for speed. Bushman and the American College of Sports Medicine (2017) encourage exercise professionals to prescribe warm-up and cool-down portions that elicit 40-50% of the endurance portion's exercise intensity.

Participants' health status and compliance with instructions to avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit were checked before they were allowed to proceed. Those who self-reported a change in health status were required to complete the PAR-Q+. If participants answered "yes" to one of the first seven questions or any questions in the follow-up section, they were prohibited from continuing. Similarly, those that self-reported consuming one of the aforementioned substances were obliged to reschedule the exercise test. Participants that did not self-report a change in health status and complied with instructions were briefed on exercise tests procedures and fitted with a chest heart rate monitor. A watch that wirelessly registers chest heart rate monitor data was used to assess heart rate at rest and monitor heart rate during exercise.

Participants began the mock exercise test by reporting their affective valence and perceived activation at rest, and walking 2 mph on a treadmill with an incline that elicited 40% of the VO_2 associated with their VT. They walked at this intensity for 5 minutes, and reported their affective valence, perceived activation and attentional focus during the last 15 seconds. The PI increased treadmill speed and incline to elicit 90% of the VO_2 associated with their VT afterward.

Participants walked at this intensity for 30 minutes, and reported their affective valence, perceived activation and attentional focus 15 seconds before the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute. Participants concluded the exercise test by walking 2 mph on a treadmill with an incline that elicited 40% of the VO_2 associated with their VT for 5 minutes, and reporting their affective valence, perceived activation and attentional focus during the last 15 seconds. Participants sat in a chair, completed the PACES immediately after cool-down and 10 minutes later, and reported their affective valence and perceived activation 10 seconds before the second PACES. Participants were left alone during the 10-minute rest period to think about the exercise test.

Before participants left, they were instructed to avoid caffeine, alcohol and tobacco 3 hours before the next laboratory visit (ACSM, 2013). Participants randomized to the experimental group were also shown how to log into the study's Netflix account and instructed to watch the first episode of "How to Get Away with Murder" two days before the third laboratory visit. This account could be accessed from any electronic deceive with a MP4 capability and an internet connection. A 9.7 inch iPad Pro, which would be used in the next exercise test, was loaned to anyone that did not have an electronic device with this capability.

3.3.7 Pre-Intervention Exposure

"How to Get Away with Murder" is a drama television show about a law professor and a group of students that become involved in a murder plot. It was chosen for its popularity, limited exposure, age-appropriate content (PG13+) and availability on Netflix. Participants in the experimental group were asked to watch the show's first episode before the treatment exercise test in order to familiarize them with and assure their enjoyment of its content. Those who did not self-report enjoyment of the first episode were prohibited from continuing because enjoyment of video content may modulate the effectiveness of an external focus (Privitera, Antonelli, & Szal, 2014). Participants in the experimental group were also asked not to watch subsequent episodes in order to standardize content during the second exercise.

3.3.8 Laboratory Visit 3: Second Exercise Test (Treatment)

Participants' health status and compliance with instructions to avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit were checked before participants were allowed to proceed. Those who self-reported a change in health status were required to complete the PAR-Q+. If participants answered "yes" to one of the first seven questions or any questions in the follow-up section, they were prohibited from continuing. Similarly, those that self-responded consuming one of the aforementioned substances were obliged to reschedule the treatment exercise test. Participants that did not self-report a change in health status and complied with instructions were reminded of exercise test procedures and fitted with a chest heart rate monitor. A watch that wireless registers chest heart rate monitor data was used to assess heart rate at rest and monitor heart rate throughout exercise.

Participants in the experimental group were also asked questions about their pre-intervention exposure before the treatment exercise test (see Appendix R for questions about intervention exposure). Their compliance with instructions to only watch the first episode of "How to Get Away with Murder" was checked using Netflix's "History" function. Participants that watched the second, third, etc. episode were prohibited from continuing because the effect of different television show content on primary and secondary outcomes is unknown, and investigators felt that it was important for the intervention to mimic normal television-watching behaviour. The second episode was uploaded onto a 9.7 inch iPad Pro, Apple in-ear headphones were plugged into the head jack, and the iPad was set against the treadmill's handgrips, putting the iPad at a 45-degree gaze downward from eye level. The PI showed continuing participants how to operate the iPad and headphones, and instructed them to start playing the episode once they began walking, pause the episode when prompted to report primary and secondary outcomes, and stop the episode once they concluded walking during the treatment exercise test.

Participants began the treatment exercise test by reporting their affective valence and perceived activation at rest, and walking 2 mph on a treadmill with an incline that elicited 40% of the VO_2 associated with their VT. They walked at this intensity for 5 minutes, and reported their affective valence, perceived activation and attentional focus during the last 15 seconds. Treadmill speed and incline were increased to elicit their "brisk" walking pace and 90% of the VO_2 associated with their VT afterward. Participants walked at this intensity for 30 minutes, and reported their affective valence, perceived activation and attentional focus 10 seconds before the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute. Participants concluded the exercise test by walking 2 mph on a treadmill with an incline that elicited 40% of the VO_2 associated with their VT for 5 minutes, and reporting their affective valence, perceived activation and attentional focus during the last 15 seconds. Participants sat in a chair, completed the PACES immediately after cool-down and 10 minutes after exercise, and reported their affective valence and perceived activation 10 seconds before the second PACES. Participants were left alone during the 10-minute rest period to think about the exercise test.

Following completion of the second PACES, participants were asked to complete the ITB and were given a $15 gift card to a store or restaurant of their choosing in order to compensate them for their time. Recall that the ITB was used to assess individuals' plans to pair television-watching with exercise in the future.

3.4 Data Collection & Storage

Participants were allocated a participant ID (XA##) upon enrollment in the study. Questionnaires and data collection sheets used to collect data were labeled using participants' ID (Appendix R), and no identifiers were associated with participants' ID to protect participants' anonymity. Data was entered into an Excel sheet immediately following laboratory visits (April – July 2017), and electronic data was transferred to SPSS once data collection concluded (July 2017). Electronic files were password-protected and stored on a password-protected drive, while paper files were locked in a drawer that only the PI had access to.

3.5 Analyses

Data were screened for outliers and assumptions underlying main analyses were tested before groups were described and analyzed for group equivalency. Significant one-way analysis of variance (ANOVA) and chi square results prompted one-way multivariate analysis of variance (MANOVAs) to establish whether demographic variables: other outcomes, BMI, predicted relative VO_2 max and predicted relative VT, should be included as covariates in subsequent analyses. Descriptive statistics were computed for outcome measures before the change in affective valence, perceived activation, enjoyment and attentional focus was calculated. Four one-way MANOVAs and subsequent ANOVAs examined multivariate and univariate intervention effects on the change in affective valence, perceived activation and attentional focus, while an independent samples t-test examined the intervention's effect on intention to bundle.

3.5.1 Outliers

Univariate and multivariate outliers were identified prior to the conduct of analyses using Box plots. Due to the study's small sample size, non-extreme multivariate outliers were retained unless a participant was identified as a multivariate outlier for $\geq$ 25% of primary and secondary outcomes. The value of an extreme univariate and multivariate outliers' outcome was replaced with the second greatest observed value for that outcome. This has shown to be a valid way to treat extreme outliers in previous studies (Dixon & Turkey, 1968; Guttman & Smith, 1969).

3.5.2 Assumption Checks

One sample Kolmogrov-Smirnov (KS) tests and quantile-quantile (Q-Q) plots assessed the normality of primary and secondary outcomes. Those that did not have a normal distribution, indicated by a significant result ($p<0.05$) and deviation from a 45-degree line, were analyzed using a Mann-Whitney U test to substantiate ANOVA results (Stevens, 2016). Box's M test assessed equal covariant effects metrices, and prompted the use of trace statistics to interpret MANOVA results when the vector of dependents did not follow a normal

distribution (Stevens, 2016). Levene's test examined the equality of variance in primary and secondary outcomes, and prompted the use of a modified degree of freedom to interpret ANOVA results when variants were significantly different ($p<0.05$) (Stevens, 2016).

3.5.3 Group Equivalency

Scale demographics: age, GLTSPAQ score, time spent exercising regularly per week, years spent exercising regularly, time spent watching television per week, number of television shows being watched, times seen "How to Get Away with Murder", BMI, predicted relative VO_2 max and predicated relative VT, were analyzed using one-way ANOVAs. Categorical demographic variables: sex, physically active/inactive status, intention to begin exercising regularly, seen "How to Get Away with Murder", history of watching television during previous exercise, frequency of watching television during previous exercise and BMI classification were analyzed using chi-square tests. Variables with a significant between-group difference ($p<0.05$) were listed as covariates in subsequent MANOVAs, as they could have had a mediating effect on intervention effects.

3.5.4 Intervention Effects

Four one-way MANOVAs examined the intervention's multivariate effect on the affective valence, perceived activation, enjoyment and attentional focus because they consisted of multiple measures that are theoretically and statistically correlated. Simultaneous analysis of change reduces the confounding effect of Type I error, allowing the change in these outcomes to be examined without increasing the likelihood of false positives (Stevens, 2016). Significant ($p<0.05$) and non-significant results prompted four one-way ANOVAs that examined the intervention's univariate effect on affective valence, perceived activation, enjoyment and attentional focus and establish whether a significant ($p<0.05$) proportion of variance was associated with one or more main effects (Sullivan & Fein, 2012).

An independent samples t-test compared groups' mean intention to bundle television-watching with aerobic exercise in order to establish whether the intervention had a significant influence ($p<0.05$) on participants' exercise plans.

Chapter 4

4 Results

No participants dropped out of the study, or were prohibited from continuing due to study ineligibility or noncompliance. Outlier screenings, assumption checks, group equivalency assessments, and descriptive and inferential statistics were, therefore, performed for all participants (n=11, n=6 in the control group and n=4 in the experimental group).

4.1 Outliers

Box Tests revealed that 13 outcome measures: affective valence during endurance and cool-down, perceived activation during warm up and after exercise, enjoyment after cool-down and exercise, and attentional focus during warm up at baseline; and affective valence during endurance and cool-down, perceived activation during endurance and cool-down, and enjoyment after cool-down and exercise at treatment, had outliers. Of the 23 outliers identified, 21 were multivariate and 4 were extreme outliers. Participant XA09 was an outlier for 8 outcome measures and extreme outlier for 2 outcome measures, representing 30% of outcome measures, so was excluded from analyses. Participants XA03 and XA10 were demarcated as extreme outliers on 2 different outcome measures so their value was replaced with the second highest or lowest observed value for that outcome (Appendix S).

4.2 Assumption Checks

The KS test revealed that 9 outcome measures had a significantly different distribution: affective valence before exercise, during cool-down and after exercise, perceived activation during warm-up and after exercise at baseline; and affective valence during cool-down, perceived activation during warm-up and cool-down, and after exercise at treatment. 5 of these outcome measures: affective valence during cool-down and after exercise, and perceived activation during warm-up and after exercise at baseline; and perceived activation after exercise at treatment, were found to have extreme

deviations from a perfect 45-degree line using Q-Q plots so Mann-Whitney U tests were performed to substantiate ANOVA results for these outcomes (Appendix T).

Box's test of equality of covariance matrices was computed for the change in enjoyment and attentional focus MANOVAs but was not computed for the change in affective valence and perceived activation MANOVAs. The latter was said to result from their being fewer than 2 non-singular cell covariance matrices, meaning that more than 2 levels of the change in outcome measures are singular or share an excess of 90%. Pillai's Trace was, therefore, used to interpret results of affective valence and perceived activation MANOVAs. Results from Box's test of equality of covariance matrices for the change in enjoyment and attentional focus were non-significant (p=0.062, p=0.091) so Wilk's Lambda was used to interpret MANOVA results for the change in these outcomes.

Levene's test of equality of error variance revealed no significant between-group differences for the change in outcome measures (Appendix U). The normal degree of freedom and first row was, therefore, used to interpret ANOVA and independent samples t-test respectively.

4.3 Group Demographics at Baseline

Descriptive statistics for groups' demographic outcomes at baseline are provided in Table 1.

Table 1: *Descriptive statistics for between-group differences in scale and categorical demographic outcomes*

Demographic Outcome	**Control Group** (n=6)	**Experimental Group** (n=4)
	Mean $\pm$ SD	Mean $\pm$ SD
Age (years)	21.67 $\pm$ 1.86	20.50 $\pm$ 0.58
Sex	Male = 3 Female = 3	Male = 0 Female = 4
GSLTPA score	10.83 $\pm$ 9.39	10.25 $\pm$ 9.50
Intention to begin exercising regularly	Not within six months = 0 Within six months = 0 Immediately = 6 Last six months = 0	Not within six months = 0 Within six months = 0 Immediately = 4 Last six months = 0

	Longer than six months = 0	Longer than six months = 0
Time spent exercising regularly per week (hours)	0.00 ± 0.00	0.25 ± 0.50
Years spent exercising regularly	0.00 ± 0.00	3.00 ± 6.00
Time spent watching television per week (hours)	13.63 ± 13.92	17.25 ± 7.72
Number of television shows being watched	1.83 ± 1.72	3.75 ± 2.87
Seen How to Get Away with Murder	No = 4 Yes = 2	No = 3 Yes = 1
Times seen How to Get Away with Murder	0.33 ± 0.52	0.25 ± 0.50
History of watching television during previous exercise	No = 6 Yes = 0	No = 1 Yes = 3
Frequency of watching television during previous exercise	0% = 6 25% = 0 50% = 0 75% = 0 100% = 0	0% = 1 25% = 2 50% = 1 75% = 0 100% = 0
BMI (kg/m^2)	23.16 ± 2.52	21.21 ± 0.95
Predicted relative VO_2 max (mL/min/kg)	37.64 ± 7.57	37.31 ± 2.85
Predicted relative VT (mL/min/kg)	20.53 ± 10.44	18.48 ± 5.95

Note: Values rounded up to the closest two decimal points.

4.4 Group Equivalency at Baseline

One-way ANOVA results confirmed that were no significant between-group differences in scale demographic variables: age, GSLTPAQ score, time spent exercising regularly per week, years spent exercising regularly, times seen How to Get Away with Murder, BMI, predicted VO_2 max and predicted relative VT, at baseline (Appendix V). Chi squares did, however, reveal that were significant between-group differences in history of watching television during previous exercise [$X^2(1) = 6.429$, $p=0.011$] and frequency of watching television during previous exercise [$X^2(2) = 6.429$, $p=0.040$] (Appendix W). It should be noted that a chi square could not be performed for intention

to begin exercising regularly because there was no variability in this demographic variable.

As groups reported significantly different history and frequency of watching television during previous exercise, separate one-way MANOVAs were performed to examine their multivariate effect on primary outcomes. MANOVAs revealed large, non-significant multivariate effects for history and frequency of watching television during previous exercise on primary outcomes. Follow-up ANOVAs revealed small to large, non-significant univariate effects for history and frequency of watching television during previous exercise outcome measures, with 70% of them being small or medium in size (Appendices X and Y). History and frequency of watching television during previous exercise were not included as covariates in analyses examining the intervention's effect on outcomes and outcome measures based on these results.

4.5 Primary Outcomes & Outcome Measures at Baseline & Treatment

Descriptive statistics for groups' primary outcome measures at baseline and treatment are provided in Table 2. Figures 4 and 5 provide a graphic illustration of groups' affective state before exercise, during warm-up, endurance, cool-down and after exercise at baseline and treatment. Recall that an affective state is a transient feeling that results from the intersection of affective valence and perceived activation according to the circumplex model.

Table 2: *Descriptive statistics for between-group differences in primary outcome measures at baseline and outcome*

Outcome Measures	**Control Group** (n=6)		**Experimental Group** (n=4)	
	Baseline Mean ± SD	Treatment Mean ± SD	Baseline Mean ± SD	Treatment Mean ± SD
Affective valence before exercise	2.67 ± 2.25	2.17 ± 1.33	2.50 ± 1.73	2.75 ± 1.89
Affective valence during warm-up	2.50 ± 1.52	2.50 ± 1.05	2.75 ± 1.26	3.25 ± 1.71
Affective valence during endurance	2.74 ± 0.46	2.23 ± 1.79	2.70 ± 0.53	3.20 ± 0.99

Affective valence during cool-down	2.83 ± 1.47	2.00 ± 1.79	3.50 ± 0.58	3.75 ± 0.96
Affective valence after exercise	2.33 ± 1.03	3.17 ± 0.41	3.00 ± 1.41	3.75 ± 0.96
Perceived activation before exercise	1.83 ± 0.75	2.67 ± 1.37	2.25 ± 0.96	1.75 ± 0.96
Perceived activation during warm-up	2.17 ± 0.98	2.33 ± 1.03	2.00 ± 0.82	2.75 ± 0.96
Perceived activation during endurance	3.17 ± 1.08	3.17 ± 0.50	2.90 ± 1.32	3.70 ± 0.82
Perceived activation during cool-down	2.83 ± 1.47	2.33 ± 0.82	2.50 ± 1.29	3.75 ± 0.96
Perceived activation after exercise	1.50 ± 0.55	1.67 ± 1.21	1.50 ± 0.58	2.50 ± 1.73
Enjoyment after cool-down	84.17 ± 11.44	82.17 ± 6.91	73.25 ± 14.45	84.50 ± 14.27
Enjoyment after exercise	85.00 ± 5.97	87.00 ± 7.24	71.25 ± 18.46	85.25 ± 15.71

Note: Values rounded up to the closest two decimal points.

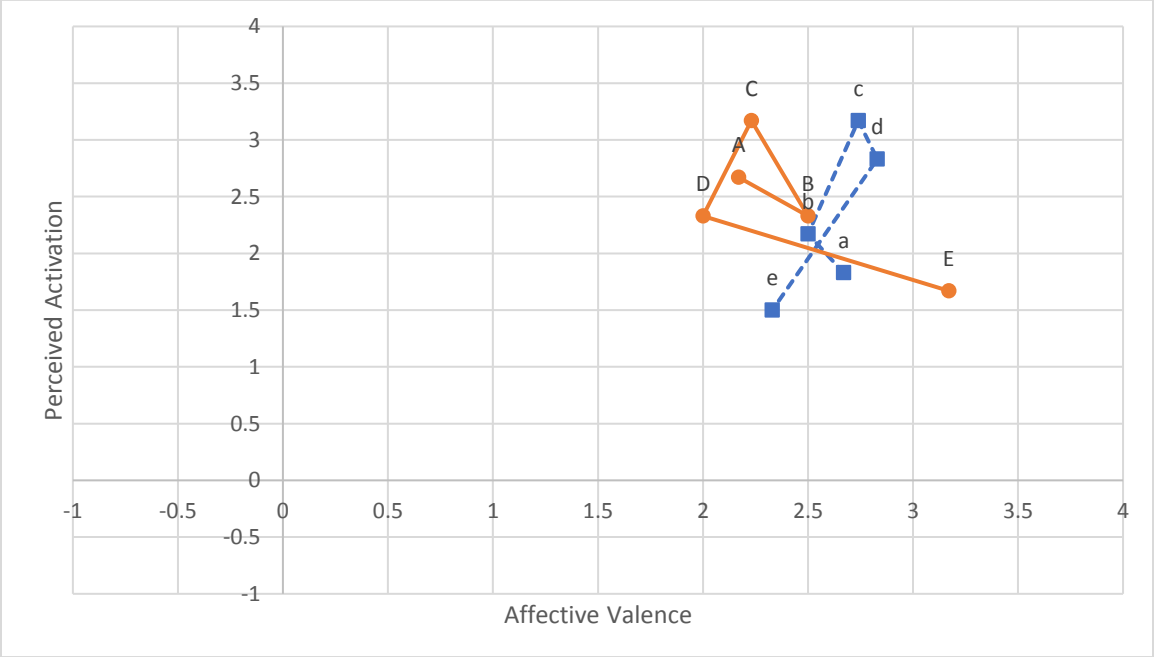

Figure 4: *Control group's affective and activation state at baseline and treatment*

a and A: Before exercise at baseline and treatment

b and B: During warm-up at baseline and treatment

c and C: During endurance at baseline and treatment

d and D: During cool-down at baseline and treatment

e and E: after exercise at baseline and treatment

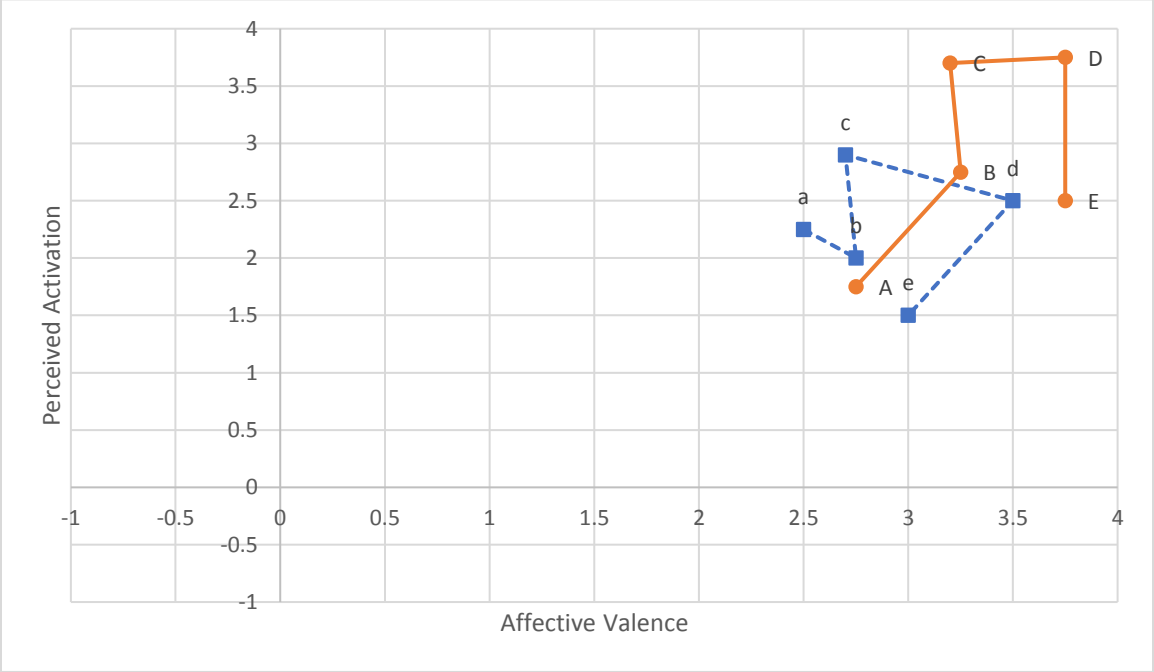

Figure 5: *Experimental group's affective state at baseline and treatment*

a and A: Before exercise at baseline and treatment

b and B: During warm-up at baseline and treatment

c and C: During endurance at baseline and treatment

d and D: During cool-down at baseline and treatment

e and E: After exercise at baseline and treatment

4.6 Between-Group Differences in Affective Valence Change

Using the difference between baseline and treatment outcome measures, a one-way MANOVA revealed a large, non-significant multivariate intervention effect for affective valence [$F(5,3)= 1.044$, $p=0.520$, $\eta_p^2=0.635$]. Follow-up ANOVAs revealed a

large, non-significant intervention effect for affective valence during cool-down, and a large, non-significant intervention effect for affective valence during endurance (see Table 3 for ANOVA results). These data indicate that participants in the experimental group reported significantly more positive affective valence during cool-down, and more positive affective valence during endurance than those in the control group because of the temptation bundle.

Table 3: *ANOVA results for affective valence change*

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[f]
Affective valence before exercise	1	7	0.173	0.690	0.024	0.065
Affective valence during warm-up	1	7	0.101	0.759	0.014	0.059
Affective valence during endurance	1	7	1.353	0.283	0.162	0.172
Affective valence during cool-down	1	7	8.838	0.021	0.558	0.723
Affective valence after exercise	1	7	0.144	0.716	0.020	0.063

f. Computed using α=0.05

Mann-Whitney U tests lent support to the ANOVA finding that the intervention had a significant effect on affective valence during cool-down (p=0.067) and the ANOVA finding that the intervention had a non-significant effect on affective valence after exercise (p=0.914).

4.7 Between-Group Differences in Perceived Activation Change

Using the difference between baseline and treatment outcome measures, a one-way MANOVA revealed a large, non-significant multivariate intervention effect for perceived activation [$F(5,4)=0.680$, $p=0.663$, $\eta_p^2=0.460$]. Follow-up ANOVAs revealed a large, non-significant intervention effect for perceived activation before exercise, and during warm-up and cool-down (see Table 4 for ANOVA results). These data indicate that participants in the experimental group reported greater perceived activation before

exercise, and during warm-up and cool-down than those in the control group because of the temptation bundle.

Table 4: *ANOVA results for perceived activation change*

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[f]
Perceived activation before exercise	1	8	4.357	0.070	0.353	0.451
Perceived activation during warm-up	1	8	1.823	0.214	0.186	0.222
Perceived activation during endurance	1	8	0.839	0.386	0.095	0.128
Perceived activation during cool-down	1	8	3.222	0.110	0.287	0.353
Perceived activation after exercise	1	8	1.231	0.299	0.133	0.165

f. Computed using α=0.05

Mann-Whitney U tests confirmed the ANOVAs' findings that the intervention had a non-significant effect on perceived activation during warm-up (p=0.352) and after exercise (p=0.352).

4.8 Between-Group Differences in Enjoyment Change

Using the difference between baseline and treatment outcome measures, a one-way MANOVA revealed a large, non-significant multivariate intervention effect for enjoyment [$F(2,7)=0.991$, $p=0.418$, $\eta_p^2=0.221$]. Follow-up ANOVAs revealed a large, non-significant intervention effect for enjoyment after cool-down and exercise (see Table 5 for ANOVA results). These data indicate that participants in the experimental group reported more enjoyment after cool-down and exercise than those in the control group because of the temptation bundle.

Table 5: *ANOVA results for enjoyment change*

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[f]

Enjoyment after cool-down	1	8	1.928	0.202	0.194	0.232
Enjoyment after exercise	1	8	1.678	0.231	0.173	0.208

f. Computed using α=0.05

4.9 Secondary Outcomes & Outcome Measures at Baseline & Treatment

Descriptive statistics for groups' secondary outcomes and outcome measures at baseline and treatment are provided in Table 6.

Table 6: *Descriptive statistics for between-group differences in secondary outcomes and outcome measures at baseline and treatment*

Outcome Measures	**Control Group** (n=6)		**Experimental Group** (n=4)	
	Baseline Mean ± SD	Treatment Mean ± SD	Baseline Mean ± SD	Treatment Mean ± SD
Attentional focus during warm-up	82.67 ± 9.29	66.25 ± 32.47	84.63 ± 2.21	77.88 ± 23.06
Attentional focus during endurance	47.25 ± 20.66	53.33 ± 11.76	58.50 ± 20.47	58.80 ± 20.66
Attentional focus during cool-down	70.92 ± 17.99	53.92 ± 27.76	67.00 ± 10.66	60.75 ± 31.54
Intention to bundle	-	3.17 ± 1.88	-	5.63 ± 1.11

Note: Values rounded up to the closest two decimal points.

4.10 Between-Group Differences in Attentional Focus Change

Using the difference between baseline and treatment outcome measures, a one-way MANOVA revealed a medium, non-significant multivariate intervention effect for attentional focus [$F(3,6)=0.198$, $p=0.894$, $\eta_p^2=0.090$]. Follow-up ANOVAs revealed a medium non-significant intervention effect for attentional focus during cool-down (see Table 7 for ANOVA results). These data indicate that participants in the experimental group were more dissociated during cool-down than those in the control group because of the temptation bundle.

Table 7: *ANOVA results for attentional focus change*

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[f]
Attentional focus during warm-up	1	8	0.368	0.561	0.044	0.084
Attentional focus during endurance	1	8	0.298	0.600	0.036	0.077
Attentional focus during cool-down	1	8	0.527	0.488	0.062	0.099

f. Computed using α=0.05

4.11 Between-Group Differences in Intention to Bundle

An independent samples t-test revealed a significant difference between the experimental and control groups' mean intention to bundle [T(8)= - 2.336, p=0.048, η_p^2=0.406] indicating that participants in the experimental group had a significantly increased intention to bundle "How to Get Away with Murder" and treadmill walking together in the future than those in the control group.

Chapter 5

5 Discussion

The study's main objective was to examine the effects that watching consecutive episodes of a television show during treadmill walking below VT had on affective variables: affective valence, perceived activation and enjoyment. It was hypothesized that this temptation bundle would a) evoke more positive affective valence during warm-up, endurance and cool-down, and after exercise; b) increase perceived activation during warm-up, endurance and cool-down, and after exercise; and c) increase enjoyment after cool-down and exercise. Temptation bundle effects on attention and plans to bundle television-watching with treadmill walking in the future were also examined. It was hypothesized that the temptation bundle would evoke a) higher attentional focus (i.e., more dissociation) during warm-up, endurance and cool-down, and b) increased intention to bundle television-watching with treadmill walking in the future. Findings and methodological issues that may have influenced these findings are discussed below.

5.1 Intervention Effects on Affective Valence

The multivariate analysis revealed a large, non-significant intervention effect for affective valence, suggesting that between-group differences existed for one or more affective valence measure(s): before exercise, during warm-up, endurance and cool-down, and after exercise. A large, significant univariate intervention effect on affective valence during cool-down, and a large non-significant univariate intervention effect on affective valence during endurance were found despite the sample's inadequate size. It should be noted that the intervention's univariate effect on affective valence during cool-down accounts for almost all (88%) of the intervention's multivariate effect on affective valence. Mann-Whitney U tests corroborated the ANOVA result for affective valence after exercise, and lent some support to the ANOVA result for affective valence during cool-down because its significance level neared significance ($p<0.05$). These results, in conjunction with descriptive statistics, indicate that the temptation bundle made affective valence more positive before exercise, during warm-up, during endurance and after

exercise, and significantly more positive during cool-down. Hence, there is support for the affective valence hypothesis.

No studies have examined the effect of watching consecutive episodes of a television show during continuous, aerobic exercise below VT on affective valence before exercise, but a study has examined the effect of watching television during continuous, aerobic exercise on affective valence at this time point. Miller, Hall and Bailey (2016) found that watching a self-selected television series or movie while cycling at a self-selected intensity for 30 minutes did not improve affective valence before exercise. This is inconsistent with the study's finding that the temptation bundle evoked more positive affective valence before exercise. Contrasting findings may be due to anticipation of television effects because television has been shown to evoke an increase in the intensity of mood (pleasant/unpleasant feelings) at rest, and participants in the experimental group expressed a fondness for the television show after pre-intervention exposure (Privitera, Antonelli, & Szal, 2014). Contrasting findings may also be due to different exercise modes, exercise intensities, external stimuli and/or the order of exercise sessions. Future studies should assess affective valence before exercise to establish whether watching television during continuous, aerobic exercise below VT evokes more positive valence at this time point, or whether this effect is specific to the restriction of television watching to exercise. Affect before exercise may influence the recalled experience that influences behaviour.

No studies have examined the effects of watching television during continuous, aerobic exercise on affective valence during warm-up and/or cool-down. However, listening to a Spotify, music streaming service, playlist (called "keep calm and stretch it") and looking at a picture of a path running through a forest during 5 minutes of cycling at a speed that "allowed [participants] to warm up" evoked more positive affective valence during warm-up and cool-down for high tolerant individuals (Carlier & Delevoye-Turrel, 2017). This is somewhat consistent with the study's finding that the temptation bundle evoked more positive affective valence during warm-up and significantly more positive affective valence during cool-down. Dissimilar findings may be attributable to exercise modes, exercise intensities and external stimuli, while differences in significance levels

may be attributable to the study's inadequate sample size or restriction of television-watching to exercise. The temptation bundle may have had a greater effect on affective valence during cool-down than warm-up because television was able to distract from internal stimuli that became more negative during endurance. Future studies should assess affective valence during warm-up and cool-down to confirm that watching television during continuous, aerobic exercise below VT evokes more positive affective valence during warm-up and significantly more positive affective valence during cool-down. Future studies should also establish whether this effect is specific to or amplified by the restriction of television watching to exercise. Although enhancement of affect at any time point is beneficial, enhancement of affect during cool-down is especially beneficial because it may contribute more to the recalled experience that influences behavior.

No studies have examined the effect of watching consecutive episodes of a television show during continuous, aerobic exercise below VT on affective valence during endurance, but a study has examined the effect of watching television during continuous, aerobic exercise below VT on affective valence at this time point. Overstreet et al. (2017) found that watching a nature program while cycling at 40% of VO_2 peak for 30 minutes significantly improved affective valence during endurance. This is consistent with the study's finding that the temptation bundle evoked more positive affective valence during endurance, as well as findings from studies examining the effects of external stimuli on affective valence after endurance (Hutchinson, Karageorghis, & Jones, 2015). Differences in significance levels may be attributable to the study's inadequate sample size and/or the restriction of television watching to exercise. Future studies should assess affective valence during endurance to confirm that watching television show during continuous, aerobic exercise below VT evokes more positive affective valence at this time point, and establish whether restricting television watching to exercise mediates this effect. Enhancement of affect during endurance is beneficial because peak affective responses to exercise typically occur during this period, and peak affective responses are thought to contribute more to the recalled experience that influences behaviour.

No studies have examined the effect of watching consecutive episodes of a television show during continuous, aerobic exercise below VT on affective valence after exercise, but a study has examined the effect of watching television during aerobic exercise on affective valence at this time point. Miller, Hall and Bailey (2016) found that watching a self-selected television show or movie while cycling at a self-selected intensity for 30 minutes did not evoke more positive affective valence after exercise. This is inconsistent with the study's finding that the temptation bundle evoked more positive affective valence after exercise, as well as findings from studies examining the effects of external stimuli on affective valence after exercise (Hutchinson, Karageorghis, & Jones, 2015). Although no formal theory explains why attention to external stimuli during endurance improves affective valence after exercise, it likely has to do with the effects that external stimuli have on affective valence during endurance and, in this case, cool-down. Contrasting findings may be due to different exercise modes, exercise intensities and/or external stimuli. Future studies should assess affective valence after exercise to establish whether watching television during continuous, aerobic exercise below VT evokes more positive affective valence at this time point, and whether this effect is amplified by the restriction of television watching to exercise. Affect after exercise may influence the recalled affective experience that influences behaviour.

5.2 Intervention Effects on Perceived Activation

The multivariate analysis revealed a large, non-significant intervention effect on perceived activation, suggesting that between-group differences existed for one or more perceived activation measures: before exercise, during warm-up, endurance and cool-down, and after exercise. Large, non-significant univariate intervention effects on perceived activation before exercise, and during warm-up and cool-down were found despite the sample's inadequate size. It should be noted that the univariate intervention effect on perceived activation before exercise and during cool-down account for most (77%, 62%) of the intervention's multivariate effect on perceived activation. Mann-Whitney U tests corroborated univariate analysis results for intervention effects on perceived activation during warm-up and after exercise. These results, in conjunction with descriptive statistics, indicate that the temptation bundle reduced perceived

activation before exercise, and increased perceived activation during warm-up, endurance and cool-down, and after exercise. Hence, there is support for the perceived activation hypothesis.

No studies have examined the effect of watching television during continuous, aerobic exercise on perceived activation before exercise. Listening to self-selected music while running at 85% of maximum heart rate for as long as possible has, however, shown to evoke greater perceived activation before exercise (Chizewski, 2016). This is inconsistent with the study's finding that the temptation bundle evoked lower perceived activation before exercise. Television's effect on perceived activation and related outcomes at rest is unknown but participants in the experimental group expressed a fondness for the television show they watched during the pre-intervention exposure; so, if television evokes low perceived activation at rest, participants in the experimental group may have reported lower perceived activation before exercise at treatment because they were anticipating television effects. Contrasting findings may also be attributable to different exercise modes, exercise intensities, external stimuli and/or the order of exercise sessions. Future studies should assess perceived activation before exercise to establish whether watching television during continuous, aerobic exercise below VT lowers perceived activation at this time point, and establish whether this effect is specific to or amplified by the restriction of television watching to exercise. Affect before exercise may influence behaviour.

No studies have examined the effects of watching television during continuous aerobic exercise during warm-up and/or cool-down. However, watching music-videos (128-132 bpm, ranked 30-32 on the Brunel Music Inventory 3 scale and found to evoke a pleasant high arousal state at rest) during 15 minutes of treadmill walking or running below VT has shown to evoke significantly greater perceived activation and more dissociation during endurance (Hutchinson, Karageorghis, & Jones, 2015). One can, therefore, presume that participants in the experimental group reported greater perceived activation while exercising at a lower intensity because cognitive appraisals were not entirely positive and attention had a greater capacity to be distracted by television. It is interesting to note that the temptation bundle did not evoke a significant univariate effect

on perceived activation during cool-down, like it did for affective valence during cool-down. It is possible that television does not have as great effect on perceived activation as it does on affective valence. Future studies should assess perceived activation during warm-up and cool-down to confirm that watching television during continuous, aerobic exercise below VT consistently evokes greater perceived activation at these time points, and establish whether this effect is specific to or amplified by restricting television watching to exercise. Enhancement of affect during cool-down is especially beneficial.

No studies have examined the effect of watching television during continuous, aerobic exercise on perceived activation during endurance either. Watching music-videos during 15 minutes of treadmill walking or running below VT has shown to evoke significantly greater perceived activation during endurance though (Hutchinson, Karageorghis, & Jones, 2015). This is consistent with the study's finding that the temptation bundle evoked greater perceived activation during endurance and makes sense. Differences in significance levels may be attributable to the study's inadequate sample size and/or restriction of television watching to exercise. Future studies should assess perceived activation during endurance to confirm that watching television during continuous, aerobic exercise below VT evokes greater perceived activation at this time point, and establish whether this effect is mediated by restricting television watching to exercise. Enhancement of affect during endurance is especially beneficial.

No studies have examined the effect of watching consecutive episodes of a television during continuous, aerobic exercise below VT on perceived activation after exercise, but two studies have examined the effect of watching television during continuous, aerobic exercise on arousal. Privitera, Antonelli and Szal (2014) found that watching enjoyed and not enjoyed television during 10 minutes of walking at 3.6 mph did not evoke a change in arousal, while Swank (2016) found that watching self-selected television while walking on a treadmill or ambulating on an elliptical for 30 minutes at a self-selected intensity evoked significantly less fatigue but no change in tranquility. Privitera, Antonelli and Szal's (2014) finding is inconsistent with the study's finding that the temptation bundle evoked greater perceived activation after exercise but Swank's (2016) findings are somewhat consistent with the study's finding that the temptation

bundle evoked greater perceived activation after exercise. Contrasting findings may be attributed to different exercise intensities, selection and enjoyment of external stimuli, and/or assessment tools; if so, it is possible that external stimuli improve perceived activation after exercise because they improve perceived activation during endurance and cool-down. Future studies should assess perceived activation after exercise to establish whether watching television during continuous, aerobic exercise below VT evokes greater perceived activation at this time point, and establish whether this effect is specific to or amplified by the restriction of television watching to exercise. Affect after exercise may influence behaviour.

5.3 Intervention Effects on Enjoyment

The multivariate analysis revealed a large, non-significant intervention effect on enjoyment, suggesting that between-group differences existed for one or more enjoyment measures: after cool-down and exercise. A large, non-significant univariate intervention effect on enjoyment after cool-down and exercise was found despite the sample's inadequate size. The intervention's univariate effect on enjoyment after cool-down and exercise account for most (87%, 78%) of the intervention's multivariate effect on affective valence. These results, in conjunction with descriptive statistics, indicate that the temptation bundle increased enjoyment after cool-down and exercise. Hence, there is support for the enjoyment hypothesis.

No study has examined the effect of watching consecutive television episodes during continuous, aerobic exercise below VT on enjoyment after cool-down, but three studies have examined the effect of watching television during continuous, aerobic exercise on enjoyment after exercise. Overstreet et al. (2017) found that watching a nature program during 30 minutes of cycling at 40% of VO_2 peak evoked significantly greater enjoyment after exercise, and Rider (2015) found that watching self-selected television show and nature program during 30 minutes of treadmill walking at 50% of HRR evoked significantly greater enjoyment after exercise; but Swank (2016) found that watching self-selected television show while walking on a treadmill or ambulating on an elliptical for 30 minutes at a self-selected intensity evoked significantly lesser enjoyment after exercise. Overstreet et al. (2017) and Rider's (2015) findings are consistent with the

study's finding that the temptation bundle evoked greater enjoyment after cool-down, while Swank's (2016) finding is inconsistent with the study's finding that the temptation bundle evoked greater enjoyment after cool-down. One would expect the temptation bundle to evoke greater enjoyment because it evoked more positive affective valence and perceived activation at multiple time points. Contradicting findings may be attributable to different exercise modes, exercise intensities, assessment tools and/or assessment timing. Differences in significance levels may be attributable to the study's inadequate sample size, selection of external stimuli and/or restriction of television watching to exercise. Future studies should assess enjoyment after exercise to establish whether watching television during continuous, aerobic exercise below VT evokes greater enjoyment at this time point, and whether this effect is mediated by the restriction of television watching to exercise. Enjoyment of exercise may more strongly influence decisions than core affect so may be a better indicator of behaviour.

No studies have examined the effects of watching television during continuous, aerobic exercise on enjoyment 10 minutes after exercise. However, listening to a Spotify music playlist and looking at a picture of a path during 30 minutes of cycling at a "somewhat difficult" intensity evoked a significantly greater enjoyment of exercise at this time point for high and low tolerant participants (Carlier & Delevoye-Turrell, 2017). This is consistent with the study's finding that the temptation bundle evoked greater enjoyment 10 minutes after exercise and makes sense, as the temptation bundle evoked more positive affective valence and perceived activation at multiple time points. Differences in significance levels may be attributable to different exercise modes, different exercise intensities, different external stimuli, restriction of television watching to exercise, and the inadequate sample size. Future studies should assess enjoyment after exercise to confirm that watching television during continuous, aerobic exercise below VT evokes greater enjoyment at this time point, and whether this effect is amplified by the restriction of television watching to exercise. Recalled affect has shown to become more exaggerated with time so may more strongly influence decisions than core affect, and enjoyment immediately after exercise (Rose & Parfitt, 2007).

5.4 Intervention Effects on Attentional Focus

The multivariate analysis revealed a large, non-significant intervention effect on attentional focus, suggesting that between-group differences existed for one or more attentional focus measures: during warm-up, endurance and cool-down. A medium, non-significant intervention effect on attentional focus during cool-down was found despite the sample's inadequate size. The intervention's univariate effect on attentional focus after cool-down accounts for most (68%) of the intervention's multivariate effect on attentional focus. These results, in conjunction with descriptive statistics, indicate that the temptation bundle increased attentional focus (i.e., elicited more dissociation) during warm-up, decreased attentional focus (i.e., elicited more association association) during endurance, and increased attentional focus during cool-down. Hence, there is partial support for the attentional focus hypothesis.

No studies have examined the effects of watching television during continuous, aerobic exercise during warm-up and/or cool-down. However, watching music-videos (ranked 30-32 on the Brunel Music Inventory 3 scale and found to evoke a pleasant high arousal state at rest) during 15 minutes of treadmill walking or running below VT has shown to evoke more dissociation during endurance (Hutchinson, Karageorghis, & Jones, 2015). One can, therefore, presume that participants in the experimental group reported a higher attentional (i.e., more dissociated) focus because attention had the capacity to be directed towards the television show. Future studies should assess attentional focus during warm-up and cool-down to confirm that watching television during continuous, aerobic exercise below VT evokes a higher attentional focus at these time points, and establish if this effect is specific to or amplified by the restriction of television watching to exercise. It is possible that participants could become more motivated to pay attention to external stimuli and, thereby, become engrossed in external stimuli if its access is restricted to exercise.

No studies have examined the effects of watching consecutive episodes of a television show during continuous, aerobic exercise below VT on attentional focus during endurance, but a study has examined the effects of watching television during continuous, aerobic exercise on attentional focus at this time point. Rider (2016) found that watching

a self-selected television show and nature program during 30 minutes of treadmill walking at 50% of HRR evoked a higher attentional focus during endurance. This is consistent with the study's finding that the temptation bundle evoked a higher attentional focus during endurance, as well as findings from studies examining the effects of external stimuli on attentional focus during endurance (Hutchinson, Karageorghis, & Jones, 2015) Although the restriction of television watching to exercise does not appear to have had an amplifying effect on attentional focus, future studies should assess attentional focus during endurance to confirm this and the study's finding that the temptation bundle evoked a higher attentional focus during endurance.

5.5 Intervention Effects on Intention to Bundle

The independent samples t-test revealed a large, significant treatment effect on intention to bundle. In conjunction with descriptive statistics, this result indicates that the temptation bundle evoked a significantly stronger intention to bundle. Hence, there is support for the intention to bundle hypothesis.

No studies have examined the effects of watching or listening to external stimuli during continuous, aerobic exercise on intention to bundle, but a study has found that listening to music during sprint interval exercise did not change intention to engage in sprint interval training; it remained positive from baseline to follow-up (Stork & Ginis, 2016). This is inconsistent with the study's finding that the temptation bundle evoked a significantly stronger intention to bundle and does not make sense, as enhanced affective responses to exercise should motivate individuals to watching television during exercise again. Contrasting findings may be due to different exercise intensities, different external stimuli, and/or the restriction of television watching to exercise, but Stork and Ginis' (2016) other finding that music enhanced affective responses to high intensity interval sprinting above VT suggests that restriction of television watching to exercise was responsible for this discrepancy. Future studies, particularly those examining the short-term effects of interventions on affective responses to exercise, should assess intention to establish whether watching television during exercise evokes a stronger intention to do so because intention to exercise is an antecedent to exercise behaviour. Future studies

should also establish whether this effect is specific to restricting television watching to exercise.

5.6 Strengths & Weaknesses

The study possesses several characteristics of a randomized control study that add rigor to its results and, thereby, allow deductions to be made about intervention effects on primary and secondary outcomes. Participants were randomly allocated to groups in blocks of two, using a random number generator, in order to equalize group size. Stringent eligibility criteria were imposed, and the effects of demographic variables with significant between-group differences on primary outcomes were examined to establish whether they needed to be included as covariates in main analyses. These steps reduced the potential for confounding or mediating variables to influence results. Experimental and control groups performed two exercise tests that, aside from the intervention, comprised of the same procedures, increasing the likelihood that results were attributable to the intervention. Pre-intervention exposure allowed participants to continue watching a television series that they enjoyed during exercise, making results representative of affective responses that would result from the restriction of television watching to exercise. Lastly, the use of mobile devices and streaming services to deliver the intervention added ecological validity to the study, increasing generalizability of results.

Despite the study's strong design, decisions to use specific procedures and materials may have influenced results. A language required was imposed to assure the provision of informed consent and compliance with procedures but did not assure understanding of study materials or television content, so it may have confounded results. Participants' tolerance of and preference for certain exercise intensities were not assessed at baseline so significant between-group differences in this demographic variable may have confounded dependent variables as well. Television-watching habit and intention to bundle questionnaires were developed by investigators so may not have provided valid and/or reliable measures of other outcomes. The examination of intervention effects could be improved by using a more stringent language requirement or materials that can be understood by individuals of various backgrounds; assessing participants' preference for and tolerance of exercise intensities using the Preference for and Tolerance of

Exercise Questionnaire (PRETIE-Q; Ekkekakis, Thome, Petruzzello, & Hall, 2008), and including them as covariates in analysis if significant between-group differences exist; and validate developed tools used to assess outcomes of interest.

Standard procedures were used to determine individuals' VT and assess their affective responses to aerobic exercise below VT, with and without television. However, the max exercise test failed to measure nine out of 11 participants' VT so a predicted value was used to calculate exercise parameters for exercise tests. The order of exercise tests was not counterbalanced so familiarity with exercise protocols may have also confounded outcomes, even though participants completed a familiarization session. Lastly, participants' enjoyment of television show content was dichotomized as "enjoyable" or "not enjoyable"; not controlling for the degree to which they enjoyed the television show may have dampened the intervention's effects on primary and secondary outcomes. The integrity of results could be improved by utilizing a different max stress test protocol and/or indirect calorimetry system; counterbalancing the order of exercise sessions if the history and frequency of watching television during previous exercise does not mediate intervention effects; and assessing participants' enjoyment of television show using a Likert scale and including it as a covariate in analyses if significant between-group differences exist.

Data analyses and result interpretation were conducted with a conservative approach, while trying not to lend too much lenience to p-values given the study's inadequate sample size. However, the decision to retain univariate and multivariate outliers rather than exclude them may have influenced primary and secondary outcomes. Not neutralizing participants' affect before exercise tests may have also dampened intervention effects on primary outcomes by forcing participants to report unexpected changes in relation to the scales' upper and lower bounds. The latter, in particular, prevents investigators from making affirmative deductions about the intervention's effect on affective valence and perceived activation before exercise. Univariate and multivariate outliers should be excluded from analyses if the sample size is adequate, and participants' affect should be neutralized before exercise tests by exposing individuals to stimuli with known effects or controlled by directing participants to think about the upcoming

exercise bout in order to protect the integrity of results without compromising the power of results.

5.7 Implications & Future Directions

Results provide preliminary evidence for intervention effects on psychological variables that describe individuals' exercise experience and plans, and imply that using a dissociative technique as a contingent reward for exercise has the potential to improve exercise adherence. Therefore, a well-powered, longitudinal study examining the temptation bundle's effects on these psychological variables is warranted. Issues and concerns identified during the interpretation of results should be addressed before this study is conducted though.

It is unknown whether watching television during continuous, aerobic exercise consistently enhances affective responses before exercise, and during warm-up and cool-down, as well as during endurance and after exercise. Studies should assess scalar psychological variables when doing so, because the assessment of categorical psychological variables is difficult to perform during exercise and might preclude the assessment of other categorical psychological variables (Ekkekakis, 2013). Furthermore, a comprehensive assessment of affective variables that have been or are proposed to be associated with exercise behaviour should be conducted using validated tools in order to optimize efforts.

It is also unknown whether watching television during continuous, aerobic exercise below VT consistently enhances affective responses before, during warm-up, endurance and cool-down, and after exercise. Researchers should prescribe exercise in relation to the VT, given its transential role in determining individuals' responses to exercise. In instances where direct and indirect calorimetry are unfeasible, researchers could utilize the "talking test" to approximate VT or encourage individuals to exercise that evokes pleasant feelings so not to supersede VT (Foster et al., 2008). While the former would allow deductions to be made about the underlying mechanism of dissociative techniques, the later requires less training and expertise to perform.

Different television content is presumed to evoke different affective responses; watching consecutive episodes of a television show is presumed to evoke superior responses to watching random television episodes of a television show; and enforcing restricted access to television is presumed to elicit superior affective responses, but there is no evidence to support as much. Similarly, there is insufficient evidence to support the theory that enjoyable television content evokes superior affective responses during exercise (Privitera, Antonelli, & Abigail, 2014). Investigators should address these literature gaps to better inform the design of a larger study on the intervention's effects on psychological variables that describe individuals' exercise experience and behaviour in the long-term.

Once aforementioned issues and concerns have been addressed, intervention effects on psychological variables could be examined in more ecologically valid environments to see whether other variables attenuate intervention effects. Collaboration with companies that have television sets in their exercise facilities or provide television streaming services could simultaneously inform the development and operation of technologies needed to deliver the intervention and, thereby, facilitate the successful implementation of this intervention in the community. The RE-AIM: reach, effectiveness, adoption, implementation and measurement framework should be kept in mind when designing these studies to maximize efforts (RE-AIM, 2017).

5.8 Conclusion

Overall, watching consecutive episodes of a television show during treadmill walking below VT has large, positive effects on affective responses: affective valence, perceived activation and enjoyment, before exercise, during warm-up, endurance and cool-down and after exercise. Observations that the temptation bundle evoked a more dissociative focus and increased intention to bundle suggest that the intervention improved affective responses to exercise by distracting individuals from internal stimuli, and that individuals plan to utilize this intervention in the future. Taken together, these findings suggest that restricting television-watching to continuous, aerobic exercise below VT makes exercise a more pleasurable experience and, thereby, a more attractive future behaviour. Study results need to be confirmed, and identified issues and

uncertainties need to be addressed before a study examining the intervention's long-term effects on affective responses to exercise below VT takes place.

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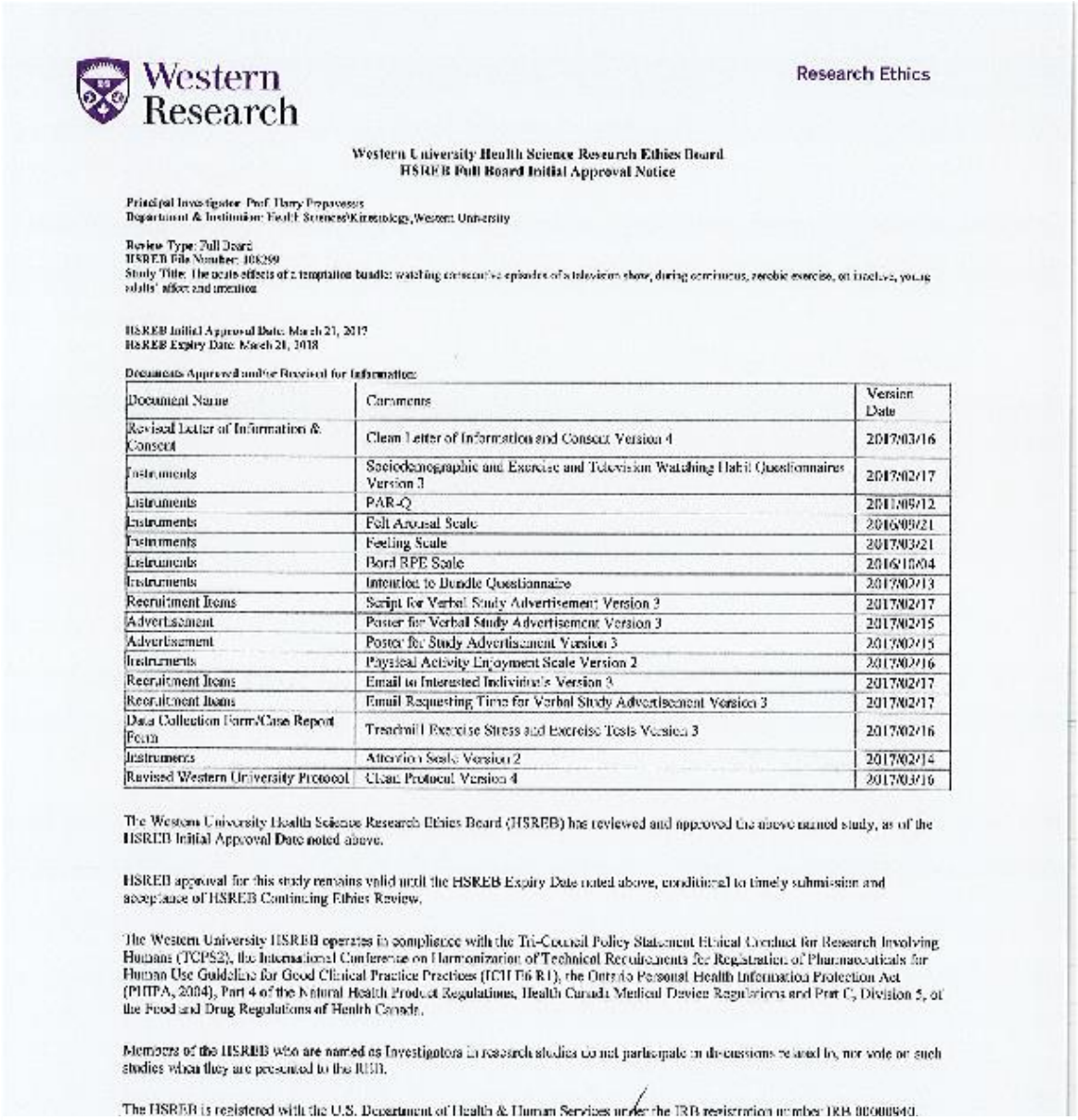
Appendix A: Approval from University of Western Ontario's Health Sciences' Research Ethics Full-Board



Western Research

Research Ethics

Western University Health Science Research Ethics Board
HSREB Full Board Initial Approval Notice

Principal Investigator: Prof. Harry Prapavessis
Department & Institution: Health Sciences\Kinesiology,Western University

Review Type: Full Board
HSREB File Number: 108299
Study Title: The acute effects of a temptation bundle: watching consecutive episodes of a television show, during continuous, aerobic exercise, on inactive, young adults' affect and intention

HSREB Initial Approval Date: March 21, 2017
HSREB Expiry Date: March 21, 2018

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Revised Letter of Information & Consent	Clean Letter of Information and Consent Version 4	2017/03/16
Instruments	Sociodemographic and Exercise and Television Watching Habit Questionnaires Version 3	2017/02/17
Instruments	PAR-Q	2011/05/12
Instruments	Felt Arousal Scale	2016/09/21
Instruments	Feeling Scale	2017/03/21
Instruments	Borg RPE Scale	2016/10/04
Instruments	Intention to Bundle Questionnaire	2017/02/13
Recruitment Items	Script for Verbal Study Advertisement: Version 3	2017/02/17
Advertisement	Poster for Verbal Study Advertisement Version 3	2017/02/15
Advertisement	Poster for Study Advertisement Version 3	2017/02/15
Instruments	Physical Activity Enjoyment Scale Version 2	2017/02/16
Recruitment Items	Email to Interested Individuals Version 3	2017/02/17
Recruitment Items	Email Requesting Time for Verbal Study Advertisement Version 3	2017/02/17
Data Collection Form/Case Report Form	Treadmill Exercise Stress and Exercise Tests Version 3	2017/02/16
Instruments	Attention Scale Version 2	2017/02/14
Revised Western University Protocol	Clean Protocol Version 4	2017/03/16

The Western University Health Science Research Ethics Board (HSREB) has reviewed and approved the above named study, as of the HSREB Initial Approval Date noted above.

HSREB approval for this study remains valid until the HSREB Expiry Date noted above, conditional to timely submission and acceptance of HSREB Continuing Ethics Review.

The Western University HSREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use Guideline for Good Clinical Practice Practices (ICH E6 R1), the Ontario Personal Health Information Protection Act (PHIPA, 2004), Part 4 of the Natural Health Product Regulations, Health Canada Medical Device Regulations and Part C, Division 5, of the Food and Drug Regulations of Health Canada.

Members of the HSREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

Appendix B: Hardy and Rejeski's (1989) **Feeling Scale** (FS)

Feeling Scale (FS)
(Hardy & Rejeski, 1989)

While participating in exercise, it is common to experience changes in mood. Some individuals find exercise pleasurable, whereas others find it to be unpleasant. Additionally, feeling may fluctuate across time. That is, one might feel good and bad a number of times during exercise. Scientists have developed this scale to measure such responses.

+5	**Very good**
+4	
+3	**Good**
+2	
+1	**Fairly good**
0	**Neutral**
-1	**Fairly bad**
-2	
-3	**Bad**
-4	
-5	**Very bad**

Appendix C: Svebak and Murgatroyd's (1985) Felt Arousal Scale

Felt Arousal Scale (FAS)
(Svebak & Murgatroyd, 1985)

Estimate here how aroused you actually feel. Do this by *saying* the appropriate number. By "arousal" we meant how "worked-up" you feel. You might experience high arousal in one of a variety of ways, for example as excitement or anxiety or anger. Low arousal might also be experienced by you in one of a number of different ways, for example as relaxation or boredom or calmness.

1 LOW AROUSAL

2

3

4

5

6 HIGH AROUSAL

Appendix D: Kendzierski and DeCarlo's (1991) **Physical Activity Enjoyment Scale** (PACES)

ID: _____

Physical Activity Enjoyment Scale (PACES)
(Kendzierski & DeCarlo, 1991)

1. Immediately after exercise, rate how you feel at the moment about the physical activity you have been doing.

I enjoy it						I hate it
1	2	3	4	5	6	7
I feel bored						I feel interested
1	2	3	4	5	6	7
I dislike it						I like it
1	2	3	4	5	6	7
I find it pleasurable						I find it unpleasurable
1	2	3	4	5	6	7
I am very absorbed in this activity						I am not at all absorbed in this activity
1	2	3	4	5	6	7
It's no fun at all						It's a lot of fun
1	2	3	4	5	6	7
I find it energizing						I find it tiring
1	2	3	4	5	6	7
It makes me depressed						It makes me happy
1	2	3	4	5	6	7
It's very pleasant						It's very unpleasant
1	2	3	4	5	6	7
I feel good physically while doing it						I feel bad physically while doing it
1	2	3	4	5	6	7
It's very invigorating						It's not at all invigorating
1	2	3	4	5	6	7
I am very frustrated by it						I am not at all frustrated by it
1	2	3	4	5	6	7

Version 2: 2/16/17 1 of 4

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID: _____

It's very gratifying						It's not at all gratifying
1	2	3	4	5	6	7

It's very exhilarating						It's not at all exhilarating
1	2	3	4	5	6	7

It's not at all stimulating						It's very stimulating
1	2	3	4	5	6	7

It gives me a strong sense of accomplishment						It does not give me a strong sense of accomplishment
1	2	3	4	5	6	7

It's very refreshing						It's not at all refreshing
1	2	3	4	5	6	7

I felt as though I would rather be doing something else						I felt as though there was nothing else I would rather doing
1	2	3	4	5	6	7

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID: _____

2. 10 minutes after exercise, rate how you feel at the moment about the physical activity you have been doing.

I enjoy it						I hate it
1	2	3	4	5	6	7
I feel bored						I feel interested
1	2	3	4	5	6	7
I dislike it						I like it
1	2	3	4	5	6	7
I find it pleasurable						I find it unpleasurable
1	2	3	4	5	6	7
I am very absorbed in this activity						I am not at all absorbed in this activity
1	2	3	4	5	6	7
It's no fun at all						It's a lot of fun
1	2	3	4	5	6	7
I find it energizing						I find it tiring
1	2	3	4	5	6	7
It makes me depressed						It makes me happy
1	2	3	4	5	6	7
It's very pleasant						It's very unpleasant
1	2	3	4	5	6	7
I feel good physically while doing it						I feel bad physically while doing it
1	2	3	4	5	6	7
It's very invigorating						It's not at all invigorating
1	2	3	4	5	6	7
I am very frustrated by it						I am not at all frustrated by it
1	2	3	4	5	6	7
It's very gratifying						It's not at all gratifying
1	2	3	4	5	6	7
It's very exhilarating						It's not at all exhilarating
1	2	3	4	5	6	7

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID: _____

It's not at all stimulating						It's very stimulating
1	2	3	4	5	6	7

It gives me a strong sense of accomplishment						It does not give me a strong sense of accomplishment
1	2	3	4	5	6	7

It's very refreshing						It's not at all refreshing
1	2	3	4	5	6	7

I felt as though I would rather be doing something else						I felt as though there was nothing else I would rather doing
1	2	3	4	5	6	7

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

Appendix E: Tammen's (1996) **Attention Scale** (AS)

Attention Scale
(Tammen, 1996)

Estimate your present state of attention right now and mark the following scale with an X to indicate your predominant focus.

Internal focus
(e.g. bodily sensations, heart rate, breathing, etc.)

External focus
(e.g. daydreaming, external environment, etc.)

Version 2: 2/14/17

Appendix F: Intention to Bundle (ITB) Questionnaire

ID: _____

Intention to Bundle Questionnaire

Please consider the scenario below, and answer the following questions by circling the number associated with the most appropriate response.

I have access to a space that is equipped with a treadmill and monitor, which allows me to watch an episode of "How to Get Away with Murder" while I walk on a treadmill

1. Each time I plan to exercise over the next two weeks, I will do so while watching an episode of "How to Get Away with Murder".

Completely disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Completely agree
1	2	3	4	5	6	7

2. Over the next two weeks, I intend to pair exercise with watching an episode of "How to Get Away with Murder".

Completely disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Completely agree
1	2	3	4	5	6	7

3. Over the next two weeks, my goal is to watch "How to Get Away with Murder" when I exercise.

Completely disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Completely agree
1	2	3	4	5	6	7

4. My intention is to combine the TV show "How to Get Away with Murder" with exercise over the next two weeks.

Completely disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Completely agree
1	2	3	4	5	6	7

Date (MM/DD/YYYY): _____ Time (HH/DD): _____

ID: _____

This information will be kept in a locked drawer in the Exercise and Health Psychology Laboratory, separate from the sociodemographic form. Only principal and co-investigators will have access to this information, unless the University of Western Ontario's Health Sciences' Research Ethics Board requires this information for quality assurance purposes. All collected in formation will be destroyed after 5 years.

Date (MM/DD/YYYY): _____ Time (HH/DD): _____

Appendix G: Sociodemographic Form

ID:_____

Sociodemographic Questionnaire

Please complete the following sections. Your personal and contact information will be used to associate your name with collected data, calibrate machinery for the treadmill exercise stress test, and direct future communications. Your emergency contact will only be contacted if you are harmed as result of study participation.

1. Personal Information

First Name: _____ Last Name: _____

Sex (F/M): _____

Birthdate (MM/DD/YYYY): _____

2. Your Contact Information

Home/Cell Phone: _____ - _____ - _____

Email Address: _____@_____

3. Your Emergency Contact's Contact Information

First Name: _____ Last Name: _____

Home/Cell Phone: _____ - _____ - _____

The above information will be kept locked in a drawer in the Exercise and Health Psychology Laboratory, separate from other collected data. Only principal and co-investigators will have access to this information, unless the University of Western Ontario's Health Sciences' Research Ethics Board requires to this information for quality assurance purposes. All collected information will be destroyed after 5 years.

Date (MM/DD/YYYY): _____Time (HH/MM): _____

Appendix H: Warburton, Jamnik, Bredin, Glenhill, and PAR-Q+ Collaboration's (2011) **Physical Activity Readiness Questionnaire** (PAR-Q+)

CSEP approved Sept 12 2011 version

PAR-Q+

The Physical Activity Readiness Questionnaire for Everyone

Regular physical activity is fun and healthy, and more people should become more physically active every day of the week. Being more physically active is very safe for MOST people. This questionnaire will tell you whether it is necessary for you to seek further advice from your doctor OR a qualified exercise professional before becoming more physically active.

SECTION 1 - GENERAL HEALTH

	Please read the 7 questions below carefully and answer each one honestly: check YES or NO.	YES	NO
1.	Has your doctor ever said that you have a heart condition OR high blood pressure?	☐	☐
2.	Do you feel pain in your chest at rest, during your daily activities of living, OR when you do physical activity?	☐	☐
3.	Do you lose balance because of dizziness OR have you lost consciousness in the last 12 months? Please answer NO if your dizziness was associated with over-breathing (including during vigorous exercise).	☐	☐
4.	Have you ever been diagnosed with another chronic medical condition (other than heart disease or high blood pressure)?	☐	☐
5.	Are you currently taking prescribed medications for a chronic medical condition?	☐	☐
6.	Do you have a bone or joint problem that could be made worse by becoming more physically active? Please answer NO if you had a joint problem in the past, but it does not limit your current ability to be physically active. For example, knee, ankle, shoulder or other.	☐	☐
7.	Has your doctor ever said that you should only do medically supervised physical activity?	☐	☐

If you answered NO to all of the questions above, you are cleared for physical activity.

Go to Section 3 to sign the form. You do not need to complete Section 2.

- Start becoming much more physically active – start slowly and build up gradually.
- Follow the Canadian Physical Activity Guidelines for your age (www.csep.ca/guidelines).
- You may take part in a health and fitness appraisal.
- If you have any further questions, contact a qualified exercise professional such as a CSEP Certified Exercise Physiologist® (CSEP-CEP) or CSEP Certified Personal Trainer® (CSEP-CPT).
- If you are over the age of 45 yrs. and NOT accustomed to regular vigorous physical activity, please consult a qualified exercise professional (CSEP-CEP) before engaging in maximal effort exercise.

If you answered YES to one or more of the questions above, please GO TO SECTION 2.

Delay becoming more active if:

- You are not feeling well because of a temporary illness such as a cold or fever – wait until you feel better
- You are pregnant – talk to your health care practitioner, your physician, a qualified exercise professional, and/or complete the PARmed-X for Pregnancy before becoming more physically active OR
- Your health changes – please answer the questions on Section 2 of this document and/or talk to your doctor or qualified exercise professional (CSEP-CEP or CSEP-CPT) before continuing with any physical activity programme.

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SECTION 2 - CHRONIC MEDICAL CONDITIONS

	Please read the questions below carefully and answer each one honestly: check YES or NO.		YES	NO
1.	Do you have Arthritis, Osteoporosis, or Back Problems?		☐ If yes, answer questions 1a-1c	☐ If no, go to question 2
	1a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	1b.	Do you have joint problems causing pain, a recent fracture or fracture caused by osteoporosis or cancer, displaced vertebra (e.g., spondylolisthesis), and/or spondylolysis/pars defect (a crack in the bony ring on the back of the spinal column)?	☐	☐
	1c.	Have you had steroid injections or taken steroid tablets regularly for more than 3 months?	☐	☐
2.	Do you have Cancer of any kind?		☐ If yes, answer questions 2a-2b	☐ If no, go to question 3
	2a.	Does your cancer diagnosis include any of the following types: lung/bronchogenic, multiple myeloma (cancer of plasma cells), head, and neck?	☐	☐
	2b.	Are you currently receiving cancer therapy (such as chemotherapy or radiotherapy)?	☐	☐
3.	Do you have Heart Disease or Cardiovascular Disease? This includes Coronary Artery Disease, High Blood Pressure, Heart Failure, Diagnosed Abnormality of Heart Rhythm		☐ If yes, answer questions 3a-3e	☐ If no, go to question 4
	3a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	3b.	Do you have an irregular heart beat that requires medical management? (e.g. atrial fibrillation, premature ventricular contraction)	☐	☐
	3c.	Do you have chronic heart failure?	☐	☐
	3d.	Do you have a resting blood pressure equal to or greater than 160/90 mmHg with or without medication? (Answer YES if you do not know your resting blood pressure)	☐	☐
	3e.	Do you have diagnosed coronary artery (cardiovascular) disease and have not participated in regular physical activity in the last 2 months?	☐	☐
4.	Do you have any Metabolic Conditions? This includes Type 1 Diabetes, Type 2 Diabetes, Pre-Diabetes		☐ If yes, answer questions 4a-4c	☐ If no, go to question 5
	4a.	Is your blood sugar often above 13.0 mmol/L? (Answer YES if you are not sure)	☐	☐
	4b.	Do you have any signs or symptoms of diabetes complications such as heart or vascular disease and/or complications affecting your eyes, kidneys, and the sensation in your toes and feet?	☐	☐
	4c.	Do you have other metabolic conditions (such as thyroid disorders, pregnancy-related diabetes, chronic kidney disease, liver problems)?	☐	☐
5.	Do you have any Mental Health Problems or Learning Difficulties? This includes Alzheimer's, Dementia, Depression, Anxiety Disorder, Eating Disorder, Psychotic Disorder, Intellectual Disability, Down Syndrome)		☐ If yes, answer questions 5a-5b	☐ If no, go to question 6
	5a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	5b.	Do you also have back problems affecting nerves or muscles?	☐	☐

Please read the questions below carefully and answer each one honestly: check YES or NO.			YES	NO
6.	Do you have a Respiratory Disease? This includes Chronic Obstructive Pulmonary Disease, Asthma, Pulmonary High Blood Pressure		☐ If yes, answer questions 6a-6d	☐ If no, go to question 7
	6a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	6b.	Has your doctor ever said your blood oxygen level is low at rest or during exercise and/or that you require supplemental oxygen therapy?	☐	☐
	6c.	If asthmatic, do you currently have symptoms of chest tightness, wheezing, laboured breathing, consistent cough (more than 2 days/week), or have you used your rescue medication more than twice in the last week?	☐	☐
	6d.	Has your doctor ever said you have high blood pressure in the blood vessels of your lungs?	☐	☐
7.	Do you have a Spinal Cord Injury? This includes Tetraplegia and Paraplegia		☐ If yes, answer questions 7a-7c	☐ If no, go to question 8
	7a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	7b.	Do you commonly exhibit low resting blood pressure significant enough to cause dizziness, light-headedness, and/or fainting?	☐	☐
	7c.	Has your physician indicated that you exhibit sudden bouts of high blood pressure (known as Autonomic Dysreflexia)?	☐	☐
8.	Have you had a Stroke? This includes Transient Ischemic Attack (TIA) or Cerebrovascular Event		☐ If yes, answer questions 8a-c	☐ If no, go to question 9
	8a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	8b.	Do you have any impairment in walking or mobility?	☐	☐
	8c.	Have you experienced a stroke or impairment in nerves or muscles in the past 6 months?	☐	☐
9.	Do you have any other medical condition not listed above or do you live with two chronic conditions?		☐ If yes, answer questions 9a-c	☐ If no, read the advice on page 4
	9a.	Have you experienced a blackout, fainted, or lost consciousness as a result of a head injury within the last 12 months OR have you had a diagnosed concussion within the last 12 months?	☐	☐
	9b.	Do you have a medical condition that is not listed (such as epilepsy, neurological conditions, kidney problems)?	☐	☐
	9c.	Do you currently live with two chronic conditions?	☐	☐

Please proceed to Page 4 for recommendations for your current medical condition and sign this document.

PAR-Q+

If you answered NO to all of the follow-up questions about your medical condition, you are ready to become more physically active:

- It is advised that you consult a qualified exercise professional (e.g., a CSEP-CEP or CSEP-CPT) to help you develop a safe and effective physical activity plan to meet your health needs.
- You are encouraged to start slowly and build up gradually – 20-60 min. of low- to moderate-intensity exercise, 3-5 days per week including aerobic and muscle strengthening exercises.
- As you progress, you should aim to accumulate 150 minutes or more of moderate-intensity physical activity per week.
- If you are over the age of 45 yrs. and NOT accustomed to regular vigorous physical activity, please consult a qualified exercise professional (CSEP-CEP) before engaging in maximal effort exercise.

If you answered YES to one or more of the follow-up questions about your medical condition:

- You should seek further information from a licensed health care professional before becoming more physically active or engaging in a fitness appraisal and/or visit a or qualified exercise professional (CSEP-CEP) for further information.

Delay becoming more active if:

- You are not feeling well because of a temporary illness such as a cold or fever – wait until you feel better
- You are pregnant - talk to your health care practitioner, your physician, a qualified exercise profesional, and/or complete the PARmed-X for Pregnancy before becoming more physically active OR
- Your health changes - please talk to your doctor or qualified exercise professional (CSEP-CEP) before continuing with any physical activity programme.

SECTION 3 - DECLARATION

- You are encouraged to photocopy the PAR-Q+. You must use the entire questionnaire and NO changes are permitted.
- The Canadian Society for Exercise Physiology, the PAR-Q+ Collaboration, and their agents assume no liability for persons who undertake physical activity. If in doubt after completing the questionnaire, consult your doctor prior to physical activity.
- If you are less than the legal age required for consent or require the assent of a care provider, your parent, guardian or care provider must also sign this form.
- Please read and sign the declaration below:

I, the undersigned, have read, understood to my full satisfaction and completed this questionnaire. I acknowledge that this physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if my condition changes. I also acknowledge that a Trustee (such as my employer, community/fitness centre, health care provider, or other designate) may retain a copy of this form for their records. In these instances, the Trustee will be required to adhere to local, national, and international guidelines regarding the storage of personal health information ensuring that they maintain the privacy of the information and do not misuse or wrongfully disclose such information.

NAME _____ DATE _____

SIGNATURE _____ WITNESS _____

SIGNATURE OF PARENT/GUARDIAN/CARE PROVIDER _____

For more information, please contact:
Canadian Society for Exercise Physiology
www.csep.ca

KEY REFERENCES
1. Jamnik VJ, Warburton DER, Makarski J, McKenzie DC, Shephard RJ, Stone J, and Gledhill N. Enhancing the eectiveness of clearance for physical activity participation; background and overall process. APNM 36(S1):S3-S13, 2011.
2. Warburton DER, Gledhill N, Jamnik VK, Bredin SSD, McKenzie DC, Stone J, Charlesworth S, and Shephard RJ. Evidence-based risk assessment and recommendations for physical activity clearance; Consensus Document. APNM 36(S1):S266-s298, 2011.

The PAR-Q+ was created using the evidence-based AGREE process (1) by the PAR-Q+Collaboration chaired by Dr. Darren E. R. Warburton with Dr. Norman Gledhill, Dr. Veronica Jamnik, and Dr. Donald C. McKenzie (2). Production of this document has been made possible through financial contributions from the Public Health Agency of Canada and the BC Ministry of Health Services. The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada or BC Ministry of Health Services.

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Appendix I: Godin and Shephard's (1985) **Godin-Shephard Leisure Time Physical Activity Questionnaire** (GSLTPAQ)

Figure 1: THE GODIN AND SHEPHARD LEISURE-TIME PHYSICAL ACTIVITY QUESTIONNAIRE

During a typical **7-day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your free time (write on each line the appropriate number).

	Times per week
STRENOUS EXERCISE **(HEART BEATS RAPIDLY)** (e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)	_____
MODERATE EXERCISE **(NOT EXHAUSTING)** (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)	_____
MILD EXERCISE **(MINIMAL EFFORT)** (e.g., yoga, archery, fishing from river bank, bowling, horseshoeing, golf without using a cart, snow-mobiling, easy walking)	_____

Adapted from Godin, G. (1983). Psychosocial factors influencing intentions to exercise in young students. Graduate Department of Community Health, University of Toronto, Toronto.

Appendix J: Exercise and Television-Watching Habit Questionnaires

ID:_____

Exercise Habit Questionnaire

Please answer the following questions. Your answers will be used to establish participant characteristics, interpret results if collected data does not support study hypotheses.

1. Do you exercise regularly? **Regular exercise** means engaging in exercise, such as jogging, swimming, going to the gym or exercise classes, 2-3 times per week or engaging in sporting activities 2-3 times per week. (Circle the most appropriate.)

    a. I currently do not exercise regularly, and I am not thinking of doing so for at least the next six months.

    b. I currently do not exercise regularly, but I am thinking of doing so sometime in the next six months.

    c. I currently do not exercise regularly, but I am taking active steps to do so in the very near future.

    d. I currently exercise regularly, but I have only begun doing so within the last six months.

    e. I currently exercise regularly, and have done so for longer than six months.

2. If you exercise one or more times per week, how many times do you exercise per week?

    _____

3. If you exercise one or more times per week, how long do you typically exercise for? (e.g. 30 minutes)

    _____

4. If you exercise one or more times per week, how many years have you been doing this for?

    _____

5. Do you exercise as part of training for a competitive sport? (Yes or No)

    _____

Date (MM/DD/YYYY): _____Time (HH/MM): _____

ID:_____

6. Do you perform cardio as part of your exercise routine? (Yes or No)

_____

7. Primary exercise activities include: (Check all that apply)

[ ] Running

[ ] Walking

[ ] Weights

[ ] Aerobics classes

[ ] Cardio equipment (e.g. cross trainer)

[ ] Sports

[ ] Swimming

[ ] Other Please specify:_____

_____

This information will be kept in a locked drawer in the Exercise and Health Psychology Laboratory, separate from the sociodemographic form. Only principal and co-investigators will have access to this information, unless the University of Western Ontario's Health Sciences' Research Ethics Board requires access to this information for quality assurance purposes. All collected information will be destroyed after 5 years.

Date (MM/DD/YYYY): _____Time (HH/MM): _____

ID:_____

Television-Watching Habit Questionnaire

Please answer the following questions. Those requesting a number should be answered using whole numbers unless otherwise specified. Your answers will be used to establish participants' characteristics, interpret results if collected data does not support study hypotheses.

1. Do you enjoy watching television? (Yes or No)

   _____

2. How many hours of television do you watch per day during the week? (Answer with 2 decimal points)

   _____

3. How many days do you watch television during the week? (Answer 1-5)

   _____

4. How many hours of television do you watch per day on the weekend? (Answer with 2 decimal points)

   _____

5. How many days do you watch television on the weekend? (Answer 1-2)

   _____

6. How many television shows are you currently watching?

   _____

7. List the television shows that you are currently watching. (Continue list on the back of this page if you are currently watching more than 10 shows.)

   a. _____

   b. _____

Date (MM/DD/YYYY): _____Time (HH/MM): _____

ID:_____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

8. What genres of television shows do you typically watch? (Check all that apply)

[ ] Action

[ ] Adventure

[ ] Animation

[ ] Comedy

[ ] Crime

[ ] Documentary

[ ] Family

[ ] Fantasy

[ ] Game-Show

[ ] Horror

[ ] Music

[ ] Musical

[ ] News

[ ] Reality-TV

[ ] Romance

[ ] Sci-Fi

Date (MM/DD/YYYY): _____Time (HH/MM): _____

ID:_____

[ ] Sport

[ ] Thriller

[ ] War

[ ] Western

[ ] Other Please specify:_____

_____

9. Have you ever seen the show "How to Get Away with Murder"? (Yes or No)

_____

10. If so, how many times have you seen the first two episodes of "How to Get Away with Murder"?

_____

11. Have you ever watched television while exercising? (Yes or No)

_____

12. If yes, how frequently do you watch television while exercising? (Circle the most appropriate)

    a. 100% All of the time

    b. 75%

    c. 50% Half of the time

    d. 25%

    e. 0% Never

13. If yes, specify what type of exercise you have performed while watching television. (Check all that apply)

    [ ] Running

    [ ] Walking

    [ ] Weights

Date (MM/DD/YYYY): _____Time (HH/MM): _____

ID:_____

[ ] Aerobics classes

[ ] Cardio equipment (e.g. cross trainer)

[ ] Sports

[ ] Swimming

[ ] Other Please specify:_____

_____

14. If yes, which of the following have you watched while exercising? (Check all that apply)

[ ] Consecutive episodes of one television show

[ ] Random episodes of one television show

[ ] Random episodes of several television shows

[ ] Other Please specify:_____

_____

15. If yes, which do you prefer watching? (Number the following 1-4, with 1 representing what you enjoy watching the most and 4 representing what you enjoy watching the least.)

[ ] Consecutive episodes of one television show

[ ] Random episodes of one television show

[ ] Random episodes of several television shows

[ ] Other Please specify:_____

_____

This information will be kept in a locked drawer in the Exercise and Health Psychology Laboratory, separate from the sociodemographic form. Only principal and co-investigators will have access to this information, unless the University of Western Ontario's Health Sciences' Research Ethics Board requires to this information for quality assurance purposes. All collected information will be destroyed after 5 years.

Date (MM/DD/YYYY): _____Time (HH/MM): _____

Appendix K: Email Requesting Time for Verbal Study Advertisement

Dear [Insert Professor's name],

My name is Lauren. I am a second-year graduate student in Kinesiology studying exercise psychology, and I am conducting a randomized control study in the Exercise and Health Psychology Laboratory. I would appreciate it if you would assist me to recruit students from [insert course code] by providing me with a few minutes of class time.

The aim of the study is to examine the acute effects of watching consecutive episodes of a television show during continuous aerobic exercise on core affect, enjoyment and attention; further, to establish whether intervention exposure influences participants' intention to pair television-watching with exercise. Core affect is an automatic feeling that occurs in response to an object or event and contributes to the formation of emotion, such as enjoyment.

This research will supplement literature on inactive, young adults' affective responses to and attention during exercise at a specific intensity, and the effects that external stimuli have on affect and attention before, during and after exercise. Results may also inform the development of an exercise program that maintains exercise. Participants will receive individualized exercise prescription and may reap acute the benefits of aerobic exercise, including improved cognitive performance.

The project has been reviewed and approved by the University of Research Ethics Board. If you have any questions and/or ethical concerns about this study, you may contact the Office of Research Ethics (phone: 519-661-3036; email: ethics@uwo.ca).

I would like to present a poster advertising the study and provide students with a brief, verbal description of the study at the beginning of your class. Study participation is voluntary so it would be the students' decision to contact the Exercise and Health Psychology Laboratory and partake in the study. Please respond to this email if you are willing to provide me with a few minutes of class time to recruit students.

Thank you in advance for your time and consideration! It is greatly appreciated.

Regards,

Lauren Crutchlow, BSc

Appendix L: Script for Verbal Study Advertisement

Script for Verbal Study Advertisement

Hello, my name is Lauren. I am a second-year graduate student in Kinesiology and am studying exercise psychology.

I am conducting a study and recruiting participants that meet the following criteria: students in university or college that are 18-35 years old, currently inactive but are able and intend to engage in regular exercise. This means that I am looking for:

- Individuals that are currently inactive and untrained
- Those who know what the gym is but are not quite sure where it is
- Those who think of exercising but stop there
- Those who are capable of exercising but are currently not

Participants must not have vision, hearing or cognitive impairment, have a mental health condition like depression or anxiety, be pregnant, or be taking medication.

This study aims to examine the short-term effects of watching consecutive episodes of a television show during aerobic exercise on affect and attention; further, to establish whether intervention exposure influences participants' intention to pair television-watching with exercise. Affect is an automatic feeling that occurs in response to objects or events and contributes to the formation of emotion, such as enjoyment.

If you volunteer as a participant in this study, you will be asked to complete 3 exercise sessions over the course of 1-2 weeks and a series of questionnaires. Select participants will also be asked to watch the first episode of a television show at home. Each exercise session will take 1 hour so the study should take at least 3-4 hours of your time. Participants will be compensated for their time.

Please contact me at XerciseAffects@gmail.com if you are interested in participating.

Thank you for your time!

Appendix M: Poster for Verbal Study Advertisement

Western HealthSciences

The acute effects of a temptation bundle: watching consecutive episodes of a television show during continuous aerobic exercise, on inactive students' affect and intention

Participate and GET FIT

Do you meet the criteria on the right? If so, you could partake in a 1-2 week study examining the effects of watching TV during exercise on your exercise experience and plans! Please email the address below for more information.

- ✓ English-speaking university or college student aged 18-35 years
- ✓ Exercise less than 2X/ week in the last 6 months
- ✓ Intend to and are able to exercise
- ✓ No vision, hearing or cognitive impairment, or mental health condition
- ✓ Not pregnant or taking medication

XerciseAffects@gmail.com

Version 3: 2/15/17

Appendix N: Poster for Study Advertisement

Western HealthSciences

The acute effects of a temptation bundle:
watching consecutive episodes of a television show during continuous aerobic exercise, on inactive students' affect and intention

Participate and GET FIT

Do you meet the criteria on the right? If so, you could partake in a 1-2 week study examining the effects of watching TV during exercise on your exercise experience and plans! Please email the address below for more information.

- ✓ English-speaking university or college student aged 18-35 years
- ✓ Exercise less than 2X/week in the last 6 months
- ✓ Intend to and are able to exercise
- ✓ No vision, hearing or cognitive impairment, or mental health condition
- ✓ Not pregnant or taking medication

XerciseAffects@gmail.com

Version 3: 2/15/17

xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com
xerciseaffects@gmail.com

Appendix O: Approved Script for Email to Interested Individuals

Script for Email to Interested Individuals

Thank you for your interest in my study! My study is designed to examine the short-term effects of watching consecutive episodes of a television show during exercise on affect and attention by assessing participants' affective responses to and attentional focus exercise at a specific intensity, without and with television; and whether intervention exposure influences participants' intention to pair television-watching with exercise by assessing their intention to do so.

Results will supplement existing literature on young adult's affective responses to exercise at an intensity proximal to the ventilatory threshold (the point at which your body cannot inhale as much oxygen as it would like), and the effects that external stimuli have on affect and attention before, during and after exercise. Results may also inform the development of an exercise program that maintains physical activity.

Once eligibility has been confirmed, you will visit the Exercise and Health Psychology Laboratory to complete questionnaires, a treadmill exercise stress test and "mock" exercise test. The remaining two laboratory visits will consist of exercise sessions that will assess your affective responses to and attentional focus during exercise proximal to your ventilatory threshold, without television and possibly with television.

Please confirm your eligibility to participate in this study by answering the following questions. You can answer them by copying and pasting the questions, with your response, into your reply to this email. You can skip any questions or refuse to complete the questionnaire but this will prevent from participating in the study.

1. Can you read and fluently speak English? (Yes or No)

   _____

2. Are you an undergraduate student at Western University? (Yes or No)

   _____

3. Are you 18-35 years of age? (Yes or No)

   _____

4. Age: _____

5. Sex (Male or Female): _____

6. **Regular exercise** means engaging in exercise, such as jogging, swimming, going to the gym or exercise classes, 2-3 times per week or engaging in sporting activities 2-3 times per week. Using this definition, circle one of the following statements that best describes you.

    a. I currently do not exercise regularly, and I am not thinking of doing so for at least the next six months.

    b. I currently do not exercise regularly, but I am thinking of doing so sometime in the next six months.

    c. I currently do not exercise regularly, but I am taking active steps to do so in the very near future.

    d. I currently exercise regularly, but I have only begun doing so within the last six months.

    e. I currently exercise regularly, and have done so for longer than six months.

7. Individuals are described as being **physically inactive** if they engage in less than 150 minutes of moderate-to-vigorous physical activity. Moderate physical activity gets you moving fast or strenuously enough to raise your heart rate and break into a sweat. In addition to these body changes, vigorous physical activity makes breathing more difficult. Do you think that you engage in less than 150 minutes of moderate-to-vigorous physical activity per week based on these descriptions? (Yes or No)

    _____

8. Are any of the following statements true? (Yes or No)

    _____

    - You are pregnant
    - You are taking prescribed medication(s)
    - You have one or more mental health conditions (e.g., depression, anxiety)
    - You have a vision, hearing or cognitive impairment that negatively impacts your television-watching experience

- You have an injury, illness or condition that restricts your participation in physical activities

If you answered questions 1-8; answered, "Yes" to questions 1, 2 and 4; and answered, "No" to question 8, please read the PAR-Q+ attached to this email and answer, questions 1-7. It is a medical screening tool that assures individuals are healthy and prepared to exercise. You do not have to print and sign this document at because you will do so during your first visit to the Exercise and Health Psychology Laboratory.

I have also attached the Letter of Information and Consent to this email for your consultation. It outlines what procedures will take place, what rights and responsibilities participants have, and what effects could result from participation. You do not have to print and sign this document because you will do so during your first visit to the Exercise and Health Psychology Laboratory.

I will schedule your first laboratory visit once you have you sent me the aforementioned information. To facilitate the scheduling of laboratory visits, I ask that you list 3 days and times that you are regularly available to meet during the week in your response. Please email me if your availability changes so that necessary accommodations can be made.

Thank you again for your interest in my study! I hope to hear from you soon.

Regards,

Lauren Crutchlow, BSc

Appendix P: Letter of Information and Consent

Western
UNIVERSITY · CANADA

School of Kinesiology, Faculty of Health Sciences
University of Western Ontario

LETTER OF INFORMATION AND CONSENT

**The Acute Effects of a Temptation Bundle:
Watching Consecutive Episodes of a Television Show during Continuous, Aerobic Exercise, on Inactive Students' Affect and Intention**

Principal Investigator

Dr. Harry Prapavessis, MA, PhD

Co-Investigator

Lauren Crutchlow

Invitation to Participate

You are invited to participate in this study because you meet the following criteria, and belong to a group that could benefit from engaging in more moderate-to-vigorous physical activity.

- English-speaking
- Student in postsecondary education (e.g., university, college)
- 18-35 years of age
- Engage in less than 150 minutes of moderate-to-vigorous physical activity per week (i.e. are physically inactive)
- Exercised less than 2 times per week in the last 6 months (i.e. do not exercise regularly)
- Intend to begin exercising regularly in the very near future
- Do not have a cardiovascular, respiratory, musculoskeletal, metabolic or mental health condition (e.g., depression, anxiety)
- Do not have another illness or injury restricting physical activity
- Do not have moderate to severe vision, hearing or cognitive impairment
- Are not pregnant
- Are not taking any prescribed medication (e.g., antibiotics, anti-inflammatories)

You should read this Letter of Information to decide whether you would like to participate in this study. The Letter of Information outlines what procedures will take place, what rights and

responsibilities participants have, and what effects could result from participation. Please take your time to review this information and ask any questions that you have. You will be asked to indicate whether you are interested in participating in this study, and to sign the Consent form if you express an interest in doing so.

What is the purpose of this study?
Core affect is an automatic feeling that contributes to the formation of emotion, such as enjoyment of exercise. Research has investigated the effects of using external stimuli, such as listening to music and/or watching video, during exercise on core affect and enjoyment but has not thoroughly investigated the effects of watching television during exercise on these measures. Research on the affective responses to and attention during aerobic exercise (e.g. walking) at intensities relative to the ventilatory threshold (i.e. the point at which the body cannot inhale as much oxygen as it would like), and aerobic exercise lasting longer than 20 minutes is also limited. The purpose of this study is to examine the effect of watching consecutive episodes of a television show during continuous, aerobic exercise on affective responses and attention before, during and after exercise proximal to the ventilatory threshold; further, to examine whether intervention exposure influences participants' intention to pair television-watching with exercise.

38 physically inactive individuals with an intention to exercise in the immediate future will be randomly allocated to control and experimental groups. Both groups will answer questionnaires to assess their characteristics (e.g., age, physical activity levels), perform a stress test to determine their ventilatory threshold, and complete two exercise tests at a submaximal intensity to assess their affective responses to and attention during exercise without and, if appropriate, with television. The experimental group will watch an episode of a drama called How to Get Away with Murder prior to the second exercise test, and one episode of How to Get Away with Murder during the second exercise test. Within and between group differences in core affect, enjoyment and attention will address gaps in literature, and supplement literature on intensity-affect relationship and affect's influence on this association. Within and between group differences in intention to watch consecutive episodes of a television show during exercise may inform exercise guidelines and practices.

What will my involvement in this study entail?

You will be asked to visit the Exercise and Health Psychology Laboratory at the University of Western Ontario 3 times, and watch an episode of "How to Get Away with Murder" at home if you are allocated to the experimental group. The study will take at least 3-4 hours of your time over the course of 10 days.

Laboratory Visit 1: Intake, Exercise Stress Test & "Mock" Exercise Test (1 hour total)
You have been instructed to avoid food, drugs, alcohol and caffeine 3 hours before visiting the lab, and to visit the Exercise and Health Psychology Laboratory wearing comfortable clothing and footwear.

Upon your arrival, the Letter of Information emailed to you will be reviewed and your questions about study procedures will be answered. You will be instructed to complete the Consent Form, and sociodemographic, physical activity, exercise habit and television-watching habit

questionnaires if you express an interest in participating in the study. These questionnaires will obtain your personal and emergency contact information, and establish your physical characteristics (e.g. age), physical activity level, exercise habits and television-watching habits. If you answer, "Yes" to one or more questions in the follow-up section of the PAR-Q+, you will not be allowed to continue participating in the study. If you answer, "No" to all questions in the follow-up section of the PAR-Q+, the co-investigator will measure your height and weight to calculate your body mass index (i.e. a height-to-weight ratio) so a computer generator can randomly allocate you to an experimental or control group based on your sex and body mass index (BMI). This method of randomization assures that all participants have an equal chance of being allocated to experimental and control groups, and that potential sex and BMI variables do not influence results. Individuals with a BMI equal to or greater than 30 kg/m^2 will not be permitted to continue participating in the study for safety reasons.

The laboratory visit will continue with an exercise stress test on a treadmill. Before starting the exercise stress test, the co-investigator will assess your blood pressure, explain exercise stress test procedures, orient you to a Rate of Perceived Exertion (RPE) Scale, fit you with an electrocardiogram (i.e. a heart activity monitor) and face mask, and assess your resting heart rate. Individuals with severe hypertension (a systolic blood pressure greater than 200 mm Hg and diastolic blood pressure greater than 110 mm Hg) will not be permitted to continue participating in the study for safety reasons. You will begin the exercise stress test by walking on a treadmill at slow speed and low incline. Treadmill speed will increase after 3 minutes to elicit a brisk walking pace, and treadmill incline will increase 2.5% every 3 minutes thereafter. The co-investigator will ask you to report your RPE by pointing to a number on a wall-mounted 20-point scale every 3 minutes. You are encouraged to continue walking until you feel too tired to continue, or until you attain a maximal oxygen consumption, a respiratory exchange ratio of 1.1 and/or your maximal heart rate. You are also encouraged to cool down afterward by walking at a normal walking speed (220-age). Your heart rate, oxygen consumption and carbon dioxide expiration will be monitored throughout testing to calculate your ventilatory threshold in order to determine the intensity of the "mock" exercise test and exercise tests. The "mock" exercise test is meant to familiarize you with exercise test tools and procedures, while exercise tests are meant to assess your affective responses to exercise and attention during exercise at a specific intensity.

Before starting the "mock" exercise test, the co-investigator will explain "mock" exercise test procedures, orient you to Feeling, Felt Arousal, Attention and Physical Activity Enjoyment Scales; fit you with a heart rate monitor, and ask you to report your resting heart rate and core affect. You will report your core affect by pointing to a number on wall-mounted Feeling and Felt Arousal Scales. You will begin the "mock" exercise test by walking on a treadmill at a slow speed and low incline for 5 minutes. The co-investigator will ask you to report your core affect and attention during the last 15 seconds of this warm-up. You will report your attention by pointing to a number on a wall-mounted Attention Scale. Treadmill speed will be increased to elicit a brisk walking pace, and incline will be increased to correspond with an intensity proximal to your ventilatory threshold afterward. You will walk at this intensity for 6 minutes, and report your core affect and attention during the last 15 seconds of this period. Treadmill speed and incline will be reduced to a slow speed and low incline afterward. You will walk at this intensity for 5 minutes, and report core affect and attention during the last 15 seconds of this cool-down. Immediately after cool-down, you will sit at a desk and report your enjoyment by circling

numbers on a paper-based Physical Activity Enjoyment Scale. The co-investigator will monitor your heart rate throughout testing.

Dates and times of remaining laboratory visits will be confirmed and, if necessary, rescheduled before you leave.

Laboratory Visit 2: Baseline Exercise Test (1 hour total)
You are instructed to avoid alcohol, caffeine and tobacco 3 hours before visiting the lab, and arrive at the Exercise and Health Psychology Lab wearing comfortable clothing and footwear.

Upon your arrival, the co-investigator will explain exercise test procedures, fit you with a chest heart rate monitor, assess your resting heart rate, and ask you to report your core affect. You will report your core affect by pointing to a number on wall-mounted Feeling and Felt Arousal Scales. You will begin the exercise test by walking on a treadmill at a slow speed and low incline for 5 minutes. The co-investigator will ask you to report your core affect and attention during the last 15 seconds of this warm-up. You will report your attention by pointing to a number on a wall-mounted Attention Scale. Treadmill speed will be increased to elicit a brisk walking pace, and incline will be increased to correspond with an intensity proximal to your ventilatory threshold afterward. You will walk at this intensity for 30 minutes, and report your core affect and attention during the last 15 seconds of the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute. Treadmill speed and incline will be reduced to a slow speed and low incline afterward. You will walk at this intensity for 5 minutes, and report your core affect and attention during the last 15 seconds of this cool-down. Immediately after cool down, you will sit at a desk and report your enjoyment by circling numbers on a paper-based Physical Activity Enjoyment Scale. You will report your core affect and enjoyment again 10 minutes later. The co-investigator will monitor your heart rate throughout testing.

Dates and times of remaining laboratory visits will be confirmed and rescheduled, if necessary, before you leave.

Intervention Exposure between Laboratory Visits 2 and 3 (43 minutes total)
If allocated to the experimental group, you will be given access to an online television streaming service after your second laboratory visit. You will be asked to watch the first episode of How to Get Away with Murder, a drama about a group of law students and their professor becoming involved in a murder plot, two days before the next laboratory visit and indicate whether you found it enjoyable. You can watch this episode by signing into investigators' Netflix (i.e. an Internet television network) account on any electronic device that has mp4 capabilities, from any location with a wireless Internet connection. Laptops and smartphones are examples of electronic devices that have mp4 capabilities. You can request to use the investigator's iPad if you do not have an electronic device with mp4 capabilities. If you enjoyed watching the first episode of How to Get Away with Murder, you should not watch anymore episodes of this television series until the second exercise test. If you did not enjoy watching the first episode of How to Get Away with Murder, you should contact principal or co-investigator to inform them of this because you will not be allowed to continue participating in the study. Refer to "Study Contacts" for principal and co-investigators' contact information.

Please be advised that How to Get Away with Murder is rated PG13+, as episodes display some violence and gore, deal with mature subject matter, and use coarse language.

Laboratory Visit 3: Outcome Exercise Test (1 hour total)
You are instructed to avoid alcohol, caffeine and tobacco 3 hours before visiting the lab, and arrive at the Exercise and Health Psychology Lab dressed in comfortable clothing and footwear

Upon your arrival, the co-investigator will explain exercise test procedures, fit you with a chest heart rate monitor, assess your resting heart rate, and ask you to report your core affect. You will report your core affect by pointing to a number on wall-mounted Feeling and Felt Arousal Scales. **If you have been allocated to the experimental group**, the investigator will also ask you questions relating to your intervention exposure between laboratory visits and turn on an iPad that will play the next episode of How to Get Away with Murder as you walk on the treadmill. You will begin the exercise test by walking on the treadmill at a slow speed and low incline for 5 minutes. The co-investigator will ask you to report your core affect and attention during the last 15 seconds of this warm-up. You will report your attention by pointing to a number on a wall-mounted Attention Scale. Treadmill speed will be increased to elicit a brisk walking pace, and incline will be increased to correspond with an intensity proximal to your ventilatory threshold afterward. You will walk at this intensity for 30 minutes, and report your core affect and attention during the last 15 seconds of the 6^{th}, 12^{th}, 18^{th}, 24^{th} and 30^{th} minute. Treadmill speed and incline will be reduced to a slow speed and low incline afterward. You will walk at this intensity for 5 minutes, and report your core affect and attention during the last 15 seconds of this cool-down as the second episode concludes. Immediately after cooling down, you will sit at a desk and report your enjoyment by circling numbers on a paper-based Physical Activity Enjoyment Scale. You will report your core affect and enjoyment again 10 minutes later. The co-investigator will monitor your heart rate throughout testing.

After the exercise test, you will be asked to complete the intention to bundle questionnaire, which will assess your plans to pair television-watching with exercise in the near future.

Potential Risks of this Study

The study procedures include participation in moderate-to-vigorous physical activity you, therefore, may be at risk of muscle fatigue and soreness, falling, musculoskeletal injury and cardiovascular events. Investigators will assess your health before you participate in the study to assure that it is safe for you to exercise. Investigators will encourage you to warm up before you exercise and cool down afterwards, incrementally increase exercise intensity and continuously monitor your heart rate to further minimize risks.

If allocated to the experimental group, you will watch television during warm-up, exercise and cool-down portions of the second exercise test. You are, therefore, at greater risk of muscle soreness and fatigue, falling, and musculoskeletal injury. However, these risks are considered minimal because of your successful completion of the first exercise test. Safety handles and handrails on the treadmill will further minimize these risks by providing you with something to hold onto during exercise, and preventing you from stepping off the sides of the treadmill.

Please refer to "Participant Responsibilities" for information on how to report injuries that limit your participation in this study, and "Participant Rights" for information on how to report injuries that result from your participation in this study. "Participant Rights" also specifies what treatment would be provided if you sustain an injury as a result from your participation in this study.

Potential Benefits of this Study

Participants may or may not benefit from this study. Exercise stress, "mock" exercise and exercise tests will increase your engagement in moderate-to-vigorous physical activity. Moderate-to-vigorous physical activity evokes biological changes that can improve health indicators (e.g. blood pressure), physical capabilities (e.g. strength) and cognitive performance.

Participant Responsibilities

You are expected to attend all aforementioned sessions. If you are unable to do so, you should contact the principal or co-investigator as soon as possible to reschedule the laboratory visit(s). Refer to "Study Contacts" for principal and co-investigators' contact information.

If you are allocated to the experimental group, you must watch one episode of With How to Get Away with Murder before you complete the second exercise test. You should contact the principal or co-investigator as soon as possible to reschedule the third laboratory visit if you are unable to do. The principal or co-investigator will reschedule the third laboratory visit upon your arrival if you fail to do so. If you are allocated to the experimental group, you must also refrain from watching following episodes of How to Get Away with Murder outside of exercise tests until you have completed the second exercise test. If you are unable to do so, you should contact the principal or co-investigator. Refer to "Study Contacts" for principal and co-investigators' contact information.

You are advised to avoid food 3 hours before the first laboratory visit. You are also advised to avoid alcohol, caffeine and tobacco 3 hours before all laboratory visits because of their effects on heart rate would put you at greater risk of cardiovascular events, such as a heart attack, and reduce the validity of data. You are also asked to come to the Exercise and Health Psychology Laboratory on time, ready to perform study procedures.

You are expected to maintain physical activities that you began the study with until the third laboratory visit. This means that you should not begin an exercise program or play any new sports until you have completed the last exercise test. You should report any abnormal physical activity to study investigators, as it could influence results. Refer to "Study Contacts" for principal and co-investigators' contact information.

Alternatives to Participating

The alternative to participating in this study is to not participate. Please refer to "Voluntary Participation & Withdrawal" for information on how to withdraw from the study if you do not wish to participate in the study.

Study Confidentiality

We will collect your full name, sex, birthdate, e-mail address and telephone number, and an emergency contact's full name and telephone for study purposes. Study purposes include, but are not limited to, scheduling appointments, sending appointment reminders, responding to inquiries or injury reports, and sharing study results. Your emergency contact will only be contacted if you incur injury as a result of your participation in this study.

No personal identifies, like your first name, will be associated with data collected during intake or exercise stress, "mock" exercise and exercise tests. Three random numbers will be assigned to you during Intake to anonymize data and assure confidentiality. No agencies, groups or persons outside of the research team will have access to identifiable data unless an internal inspection, external inspection or external audit takes place, or non-compliance to study protocols is reported. The University of Western Ontario's Health Sciences' Research Ethics Board may require access to study records in these instances.

Collected information will be locked in a cabinet in a secure office that only the principal and co-investigators have access to. Data entered into Excel spreadsheets will be password-protected and stored on computers in the same secure office. If results are presented to groups of researchers or health care professionals, they will be collectively presented as group data. Your name and information will not be disclosed to anyone without your consent.

All information and data will be kept for 5 years and then destroyed, as is standard procedure for the University of Western Ontario.

Costs of Participation

You do not have to pay for any study procedures.

A parking voucher will be given to you if you drive to the Exercise and Health Psychology Lab. No other costs are anticipated to result from your participation in this study.

Compensation for Participation

You will be compensated with a gift card, valuing $15, to thank you for your time and contribution to research.

Voluntary Participation & Withdrawal

Participation in this study is voluntary. You may decide to not participate, or participate in the study now and change your mind later. If you decide to withdraw from the study, you must indicate this to the primary or co-investigator.

You are obligated to complete demographic questionnaires in order to assure study eligibility, but you may refuse to answer any other questions you do not want to answer by saying, "pass".

You will not be penalized in any way for refusing to answer aforementioned questions or withdrawing from the study.

Participant Rights

If you decide to withdraw from the study, previously collected information may be used to address study objectives but no new information will be collected without your permission.

You should contact the principal or co-investigator as soon as possible if you require treatment for any injuries resulting from your participation in this study. The principal or co-investigator will coordinate appropriate treatment at no additional cost to you. Refer to "Study Contacts" for the principal and co-investigators' contact information.

You do not waive any legal rights by signing the consent form. You will be given a copy of this letter of information and the consent form once they have been initialed and signed.

Study Contacts

Western
UNIVERSITY · CANADA

School of Kinesiology, Faculty of Health Sciences
University of Western Ontario

CONSENT FORM

The Acute Effects of a Temptation Bundle: Watching Consecutive Episodes of a Television Show during Continuous, Aerobic Exercise on Affect and Enjoyment

Person Obtaining Consent

I have discussed this study in detail with the participant, and believe they understand what is involved in the study.

_____	_____	_____
Name (please print)	Signature	Date (dd/mm/yyyy)

Participant

Please check the appropriate box below.

____ I agree to be contacted for future research studies

____ I do NOT agree to be contacted for future research studies

I have read the preceding information thoroughly. I have had an opportunity to ask questions, and all of my questions have been answered to my satisfaction. I agree to participate in this study.

_____	_____	_____
Name (please print)	Signature	Date (dd/mm/yyyy)

Witness

I was present when information in this form was explained and discussed with the participant. I believe they understand what the study involves.

_____	_____	_____
Name (please print)	Signature	Date (dd/mm/yyyy)

Appendix Q: Borg's (1982) **Rate of Perceived Exertion** (RPE)

Instructions to The Borg RPE Scale

During the work we want you to rate your perception of exertion, i.e. how heavy and strenuous the exercise feels to you and how tired you are. The perception of exertion is mainly felt as strain and fatigue in your muscles and as breathlessness or aches in the chest.

Use this scale from 6 to 20, where **6** means "No exertion at all" and **20** means "Maximal exertion".

9	Very light. As for a healthy person taking a short walk at his or her own pace.
13	Somewhat hard. It still feels OK to continue.
15	It is hard and tiring, but continuing is not terribly difficult.
17	Very hard. It is strenuous. You can still go on, but you really have to push yourself and you are very tired.
19	An extremely strenuous level. For most people this is the most strenuous exercise they have ever experienced.

Try to appraise your feeling of exertion and fatigue as spontaneously and as honestly as possible, without thinking about what the actual physical load is. Try not to underestimate, nor to overestimate. It is your own feeling of effort and exertion that is important, not how it compares to other people's. Look at the scale and the expressions and then give a number. You can equally well use even as odd numbers.

Any questions?

The Borg RPE Scale (RPE)
(Borg, 1998)

6	**No exertion at all**
7	
	Extremely light
8	
9	**Very light**
10	
11	**Light**
12	
13	**Somewhat hard**
14	
15	**Hard (heavy)**
16	
17	**Very hard**
18	
19	**Extremely hard**
20	**Maximal exertion**

Appendix R: Max Stress, and Baseline and Treatment Exercise Test Data Collection Sheets

ID:_____

Data Collection Sheet for Treadmill Exercise Stress Test

Laboratory Visit 1

1. Pre-Test Gas Sampling

O_2 Pre: _____ CO_2 Pre: _____

2. Safety Check

Did the participant avoid food, alcohol, caffeine and tobacco 3 hours before the laboratory visit? (Yes or No) If no, reschedule laboratory visit.

_____

3. Anthropometric Measurements

Weight (kg): _____ Height (cm): _____

BMI (kg/cm^2): _____ If BMI≥30 kg/m^2, exclude participant.

4. Balke Protocol Measures

Blood pressure (systolic/diastolic): _____ If systolic BP>200 mmHg and diastolic BP>120 mmHg, exclude participant.

Maximal heart rate (bpm): _____

Heart rate at rest (bpm): _____ Heart rate at max (bpm): _____

RER: _____

RPE: _____

Absolute VO_2max (mL/min): _____ Relative VO_2max (mL/min/kg): _____

Predicted VO_2max (mL/min/kg): _____ % of Predicted VO_2 max: _____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Did the participant hold onto the treadmill's handrails? (Yes or No)

_____

5. Ventilatory Threshold

VT (mL/min/kg): _____

6. Post-Test Gas Sampling

O_2 Pre: _____ CO_2 Pre: _____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Data Collection Sheet for Baseline Exercise Test (Experimental Group)

Laboratory Visit 2

1. Safety Check

Did the participant avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit? (Yes or No) If no, reschedule laboratory visit.

_____

Has the participants' health changed since the last laboratory visit? (Yes or No) If yes, administer the PARQ+ again to see if it is safe for the participant to continue.

_____

2. Pre-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
0:00					

3. Warm-up Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
4:45-5:00					

4. **Exercise Measures**

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
10:45-11:00					
16:45-17:00					
22:45-23:00					
28:45-29:00					
24:45-35:00					

5. Cool-down Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
39:45-40:00					

6. Post-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
40:00					
50:00					

7. Intervention Exposure

Date (MM/DD/YYYY): _____ Should be two days before the next exercise test.

Was the participant told to only watch the first episode of the assigned television show before the next laboratory visit? (Yes or No)

_____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Was the participant told to contact the co-investigator as soon as possible if they did not enjoy watching the first episode of the assigned television show? (Yes or No)

_____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Data Collection Sheet for Baseline Exercise Test (Control Group)

Laboratory Visit 2

1. Safety Check

Did the participant avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit? (Yes or No) If no, reschedule laboratory visit.

_____

Has the participants' health changed since the last laboratory visit? (Yes or No) If yes, administer the PARQ+ again to see if it is safe for the participant to continue.

_____

2. Pre-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
0:00					

3. Warm-up Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
4:45-5:00					

4. **Exercise Measures**

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
10:45-11:00					
16:45-17:00					
22:45-23:00					
28:45-29:00					
24:45-35:00					

5. Cool-down Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
39:45-40:00					

6. Post-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
40:00					
50:00					

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Data Collection Sheet for Outcome Exercise Test (Experimental Group)

Laboratory Visit 3

1. Safety Check

Did the participant avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit? (Yes or No) If no, reschedule laboratory visit.

_____

Has the participants' health changed since the last laboratory visit? (Yes or No) If yes, administer the PARQ+ again to see if it is safe for the participant to continue.

_____

2. Intervention Exposure Check

Did the participant watch the first episode of the assigned television show? (Yes or No) If no, reschedule the third laboratory visit.

_____

Did the participant watch the first episode of the assigned television show on the scheduled intervention date? (Yes or No)

_____

If no, how many days before the 3rd laboratory visit did participants watch the first episode of the assigned television show?

_____

Did participants watch subsequent episodes of the assigned television show before the laboratory visit? (Yes or No)

_____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

If yes, which episodes? (List using season and episode numbers) Play the next episode during the exercise test.

_____

_____

_____

_____

3. Pre-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
0:00					

4. Warm-up Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
4:45-5:00					

5. Exercise Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
10:45-11:00					
16:45-17:00					
22:45-23:00					

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

28:45-29:00					
24:45-35:00					

6. Cool-down Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
39:45-40:00					

7. Post-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
40:00					
50:00					

8. Post Intervention Check

Which episodes did the participant watch during today's exercise test? (List using season and episode numbers)

_____

_____

_____

_____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Data Collection Sheet for Outcome Exercise Test (Control Group)

Laboratory Visit 3

1. Safety Check

Did the participant avoid alcohol, caffeine and tobacco 3 hours before the laboratory visit? (Yes or No) If no, reschedule laboratory visit.

_____

Has the participants' health changed since the last laboratory visit? (Yes or No) If yes, administer the PARQ+ again to see if it is safe for the participant to continue.

_____

2. Pre-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
0:00					

3. Warm-up Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
4:45-5:00					

4. Exercise Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

ID:_____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
10:45-11:00					
16:45-17:00					
22:45-23:00					
28:45-29:00					
24:45-35:00					

5. Cool-down Measures

Target VO_2 (mL/kg): _____

Speed (km/h): _____ Incline (%): _____

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
39:45-40:00					

6. Post-Exercise Measures

Time	Affective Valence	Perceived Activation	Attentional Focus	Enjoyment of Exercise	Heart Rate
40:00					
50:00					

Date (MM/DD/YYYY): _____ Time (HH/MM): _____

Appendix S: Box Test Results for Primary and Secondary Outcome Measures

Outcome Measure	Outliers
Affective valence during endurance at baseline	XA10*
Affective valence during cool down at baseline	XA10
Perceived activation during warm up at baseline	XA3, XA5, XA9*, XA11
Perceived activation after exercise at baseline	XA9
Enjoyment after cool down at baseline	XA9
Enjoyment after exercise at baseline	XA4, XA9
Perceived activation during endurance at treatment	XA9
Perceived activation during cool down at treatment	XA9
Enjoyment after cool down at treatment	XA4, XA9*
Enjoyment after exercise at treatment	XA9
Attentional focus during warm up at baseline	XA3*, XA6, XA9, XA11
Affective valence during endurance at treatment	XA9, XA10
Affective valence during cool down at treatment	XA10

* Extreme outlier

Appendix T: KS Test Results for Primary and Secondary Outcome Measures

Outcome Measure[a]	Statistic	df	Sig.
Affective valence before exercise at baseline	0.281	10	0.024
Affective valence during warm up at baseline	0.217	10	0.200*
Affective valence during endurance at baseline	0.225	10	0.164
Affective valence during cool down at baseline	0.367	10	0.000
Affective valence after exercise at baseline	0.333	10	0.002
Perceived activation before exercise at baseline	0.200	10	0.200*
Perceived activation during warm up at baseline	0.345	10	0.001
Perceived activation during endurance at baseline	0.146	10	0.200*
Perceived activation during cool down at baseline	0.200	10	0.200*
Perceived activation after exercise at baseline	0.329	10	0.003
Enjoyment after cool down at baseline	0.185	10	0.200*
Enjoyment after exercise at baseline	0.177	10	0.062
Attentional focus during warm up at baseline	0.149	10	0.200*
Attentional focus during endurance at baseline	0.206	10	0.200*
Attentional focus during cool down at baseline	0.256	10	0.200*
Affective valence before exercise at treatment	0.195	10	0.200*
Affective valence during warm up at treatment	0.160	10	0.200*
Affective valence during endurance at treatment	0.247	10	0.086
Affective valence during cool down at treatment	0.270	10	0.037
Affective valence after exercise at treatment	0.416	10	0.000
Perceived activation before exercise at treatment	0.195	10	0.200*
Perceived activation during warm up at treatment	0.297	10	0.013
Perceived activation during endurance at treatment	0.217	10	0.200*
Perceived activation during cool down at treatment	0.264	10	0.047
Perceived activation after exercise at treatment	0.300	10	0.011
Enjoyment after cool down at treatment	0.226	10	0.200*
Enjoyment after exercise at treatment	0.210	10	0.200*
Attentional focus during warm up at treatment	0.178	10	0.158
Attentional focus during endurance at treatment	0.196	10	0.200*
Attentional focus during cool down at treatment	0.178	10	0.200*
Intention to bundle	0.218	10	0.194

* This is a lower bound of true significance

a. Lilliefors Significance Correction

Appendix U: Levene's Test of Equality of Error Variance Results for Outcome Measures' Change[a]

Change in Outcome Measures	F	df1	df2	Sig.
Affective valence before exercise	5.618	1	7	0.050
Affective valence during warm up	2.514	1	7	0.157
Affective valence during endurance	1.150	1	7	0.319
Affective valence during cool down	0.007	1	7	0.936
Affective valence after exercise	0.030	1	7	0.868
Perceived activation before exercise	0.094	1	8	0.767
Perceived activation during warm up	4.919	1	8	0.057
Perceived activation during endurance	0.488	1	8	0.505
Perceived activation during cool down	0.576	1	8	0.470
Perceived activation after exercise	0.632	1	8	0.449
Enjoyment during cool down	2.090	1	8	0.317
Enjoyment after exercise	2.637	1	8	0.186
Attentional focus during warm up	0.082	1	8	0.143
Attentional focus during endurance	0.012	1	8	0.917
Attentional focus during cool down	0.536	1	8	0.485

a. Design: Intercept + Group

Appendix V: ANOVA Results for Between-Group Differences in Scale Demographic Outcomes at Baseline

Demographic Outcome		**df**	**F**	**Sig.**
Age	Between Groups	1	1.425	0.267
	Within Groups	8	-	-
GSLTPA score	Between Groups	1	0.009	0.926
	Within Groups	8	-	-
Time spent exercising regularly per week	Between Groups	1	1.600	0.242
	Within Groups	8	-	-
Years spent exercising regularly	Between Groups	1	1.600	0.242
	Within Groups	8	-	-
Time spent watching television per week	Between Groups	1	0.007	0.938
	Within Groups	8	-	-
Number of television shows being watched	Between Groups	1	1.782	0.219
	Within Groups	8	-	-
Times seen How to Get Away with Murder	Between Groups	1	0.064	0.807
	Within Groups	8	-	-
BMI	Between Groups	1	2.114	0.184
	Within Groups	8	-	-
Predicted relative VO_2max	Between Groups	1	0.007	0.937
	Within Groups	8	-	-
Predicted relative VT	Between Groups	1	0.125	0.733
	Within Groups	8	-	-

Appendix W: Chi Square Results for Between-Group Differences in Categorical Demographic Outcomes at Baseline

Demographic Variable	Value	df	Asymptotic Sig. (2-sided)
Sex	2.857[a]	1	0.091
Intention to begin exercising regularly	-	-	-
Seen How to Get Away with Murder	0.079[a]	1	0.778
History of watching television during previous exercise	6.429[a]	1	0.011
Frequency of watching television during previous exercise	6.429[b]	2	0.040

a. 4 cells (100%) have expected count less than 5. The minimum expected count is 1.20.

b. 6 cells (100%) have expected count less than 5. The minimum expected count is 0.40.

Note: Sex, seen How to Get Away with Murder and history of watching television during previous exercise were computed only for a 2x2 table.

Appendix X: Examination of History of Watching Television during Previous Exercise's Effects on Outcomes & Outcome Measures

Table 1: Box's Test of Equality of Covariance Metrices[a] for History of Watching Television during Previous Exercise

Dependent Variable	Box M	F	df1	df2	Sig.
Affective valence	-	-	-	-	-
Perceived activation	-	-	-	-	-
Enjoyment	5.369	1.066	3	230.116	0.364

a. Design: Intercept + TVdE

Table 2: Multivariate Effect of History of Watching Television during Previous Exercise on the Change in Primary Outcomes[a]

Dependent Variable	Effect	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Observ Power
Affective valence	Pillai's Trace[b]	0.583[c]	5.000	3.000	0.721	0.493	0.0
Perceived activation	Pillai's Trace[b]	0.199[c]	5.000	4.000	0.947	0.199	0.0
Enjoyment	Wilk's Lambda	0.047[c]	2.000	7.000	0.954	0.013	0.0

a. Design: Intercept + TVdE

b. Utilized because Box Test of Equality of Covariance Matrices not computed

c. Exact statistic

d. Computed using alpha =0.05

Table 3: Levene's Test of Equality of Error Variances[a] for History of Watching Television during Previous Exercise

Change in Outcome Measures	F	df1	df2	Sig.
Affective valence before exercise	6.161	1	7	0.042

Affective valence during warm up	8.784	1	7	0.021
Affective valence during endurance	1.243	1	7	0.302
Affective valence during cool down	4.971	1	7	0.536
Affective valence after exercise	0.424	1	7	0.536
Perceived activation before exercise	4.939	1	8	0.057
Perceived activation during warm up	0.406	1	8	0.542
Perceived activation during endurance	1.035	1	8	0.339
Perceived activation during cool down	3.075	1	8	0.118
Perceived activation after exercise	2.210	1	8	0.175
Enjoyment after cool down	0.881	1	8	0.375
Enjoyment after exercise	0.040	1	8	0.846

a. Design: Intercept + TVdE

Table 4: Univariate Effects of History of Watching Television during Previous Exercise on Primary Dependent Variable Change

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[a]
Affective valence before exercise	1	7	0.010	0.923	0.001	0.051
Affective valence during warm up	1	7	0.259	0.626	0.036	0.073
Affective valence during endurance	1	7	0.151	0.710	0.021	0.063
Affective valence during cool down	1	7	1.167	0.316	0.143	0.155
Affective valence after exercise	1	7	0.233	0.644	0.032	0.070
Perceived activation before exercise	1	8	0.263	0.622	0.032	0.074
Perceived activation during warm up	1	8	0.035	0.857	0.004	0.053
Perceived activation during endurance	1	8	0.223	0.649	0.027	0.070
Perceived activation during cool down	1	8	0.024	0.881	0.003	0.052
Perceived activation after exercise	1	8	0.077	0.789	0.010	0.057
Enjoyment after cool down	1	8	0.062	0.810	0.008	0.056

Enjoyment after exercise	1	8	0.106	0.753	0.013	0.060

a. Computed using $\alpha = 0.05$

Appendix Y: Examination of Frequency of Watching Television during Previous Exercise's Effects on Outcomes & Outcome Measures

Table 1: Multivariate Effect of Frequency of Watching Television during Previous Exercise on the Change in Primary Outcomes[a]

Effect	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Observed Power[c]
Pillai's Trace[b]	0.758	10.000	6.000	0.668	0.558	0.157
Pillai's Trace[b]	0.628	10.000	8.000	0.759	0.440	0.157
Pillai's Trace	0.482	4.000	14.000	0.749	0.121	0.132

a. Design: Intercept + fTVdE

b. Utilized because Box Test of Equality of Covariance Matrices not computed

c. Computed using alpha =0.05

Table 2: Levene's Test of Equality of Error Variances[a] for Frequency of Watching Television during Previous Exercise

Change in Outcome Measures	F	df1	df2	Sig.
Affective valence before exercise	2.641	2	6	0.150
Affective valence during warm up	3.765	2	6	0.087
Affective valence during endurance	1.295	2	6	0.341
Affective valence during cool down	2.130	2	6	0.200
Affective valence after exercise	2.000	2	6	0.216
Perceived activation before exercise	2.161	2	7	0.186
Perceived activation during warm up	2.527	2	7	0.149
Perceived activation during endurance	1.086	2	7	0.388
Perceived activation during cool down	1.717	2	7	0.247
Perceived activation after exercise	1.533	2	7	0.280
Enjoyment after cool down	0.473	2	7	0.642
Enjoyment after exercise	1.023	2	7	0.408

a. Design: Intercept + fTVdE

Table 3: Univariate Effects of Frequency of Watching Television during Previous Exercise on the Change in Primary Outcome Measures

Change in Outcome Measures	df	Error df	F	Sig.	Partial Eta Squared	Observed Power[a]
Affective valence before exercise	2	6	0.004	0.996	0.001	0.050
Affective valence during warm up	2	6	0.111	0.897	0.036	0.061
Affective valence during endurance	2	6	0.234	0.798	0.072	0.073
Affective valence during cool down	2	6	0.500	0.630	0.143	0.100
Affective valence after exercise	2	6	2.167	0.196	0.419	0.287
Perceived activation before exercise	2	7	0.115	0.893	0.032	0.062
Perceived activation during warm up	2	7	0.646	0.553	0.156	0.120
Perceived activation during endurance	2	7	0.331	0.729	0.086	0.085
Perceived activation during cool down	2	7	0.034	0.967	0.009	0.053
Perceived activation after exercise	2	7	0.082	0.922	0.023	0.058
Enjoyment after cool down	2	7	0.040	0.961	0.011	0.054
Enjoyment after exercise	2	7	0.705	0.526	0.168	0.127

a. Computed using $\alpha = 0.05$

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